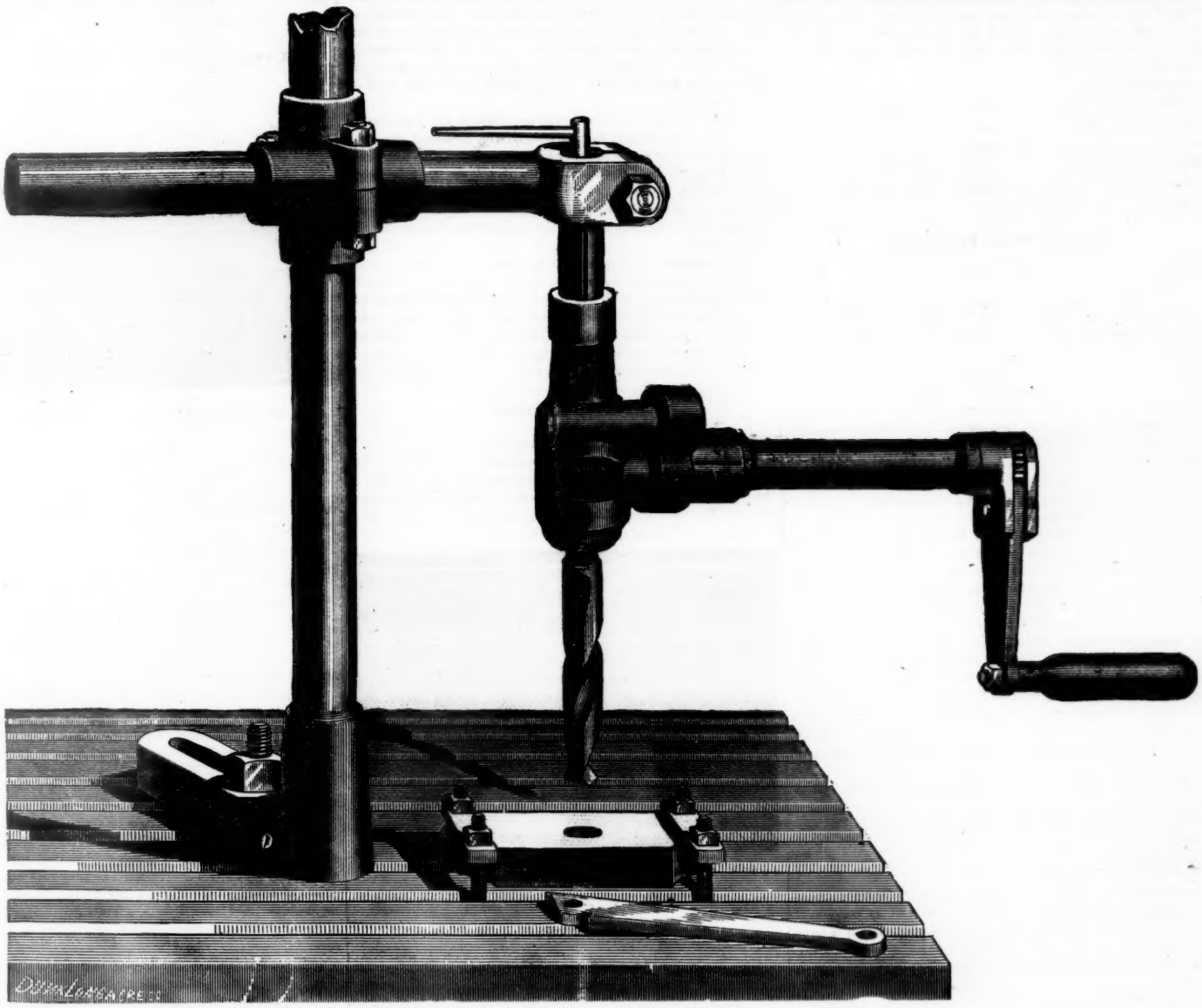
RAILROAD GAZETTE

SATURDAY, JANUARY 11, 1873.

Portable Hand Drill.

This tool is intended for the same work for which a common ratchet is ordinarily used. Its construction is very clearly represented by the engraving, so that little explanation will be required. It is operated by turning a crank, and has a self-feed inclosed inside of the casing. By this arrangement it is claimed that the holes are drilled more truly than by an ordinary ratchet, and with less labor to the operator. These drills are manufactured by Messrs. C. Van Haagen & Co., of Philadelphia.



PORTABLE SELF-FEEDING HAND-DRILL.

Standard Horse-Power.

At a convention of engine builders and machinists, recently held at Cincinnati, the committee on uniformity in rating power, consisting of Arthur G. Moore, James R. Maxwell and D. A. Woodbury, submitted the following:

"That four circular inches area of piston be the unit of commercial horse-power for what is known as a high-pressure steam engine.

"Provided, always, that it be so constructed, and of such proportions as to be capable of maintaining an average pressure of thirty-five pounds of steam to the square inch, with a piston velocity of 400 feet per minute or the equivalent.

"That in estimating boilers, the whole of the fire and heating surface be accounted, and the standard of the plain cylinder boiler be twelve square feet, and for those consisting in part of flues and tubes, it be sixteen square feet as the unit of *commercial horse-power*.

"Provided, always, that the boiler be so proportioned and arranged as to be capable of evaporating forty-five pounds of water per unit of *commercial horse-power* per hour.

"Your committee do not present these figures as the result of their own individual opinions or practice, but as the embodiment, as far as possible, of the average practice of the makers of such engines and boilers throughout the country."

The Westinghouse Brake Abrocd.

Engineering says: "Eighty carriages and eight locomotives, forming a part of the rolling stock of the Mexican Railway, are being fitted with the Westinghouse air brake. We are glad to find that English engineers are rapidly adopting it for foreign railways, amongst others, we may mention the Poti & Tiflis Railway, and the railways in the State of Tarapaca in Peru. During last week, M. Stivart, an engineer connected with the Belgian State railways, visited this country to inspect the brake, with the view to its experimental introduction upon the Belgian Government lines."

Contributions.

Rules and Regulations of Massachusetts Railroads.

[CONTINUED FROM PAGE 550, VOL. IV.]

TO THE EDITOR OF THE RAILROAD GAZETTE:

In the two papers already published under this heading, I have quoted examples sufficient to bear out my assertion that there is apparent in the framing of the rules something more than mere carelessness; there is a want of appreciation of the necessity of attention to detail in such matters, and it appears to me there is a want of familiarity with the subject. I might quote many more examples, but four will suffice:

b 64. "Each freight conductor will see to making up his train, and that the doors of all the cars are closed and properly secured. If any car is not so loaded that it can run with safety to the freight or the train, he will notify the agent at the station and leave it to be reloaded."

There is no attempt to instruct the conductor how to ascertain that the car is not improperly loaded. He surely is not expected to open the door and examine each car? There is the usual vagueness about the rule; the usual attempt to draft a rule that shall suit all circumstances and all occasions, and as a result the usual failure.

(*c*) 79.—"When one train is following another, the engineman will approach stations with caution, when there is reason to expect other trains to be standing there."

The engineMAN! Which one: the leading or the following? This may be a clerical or typographical error. Both enginemen may be meant. But are they to approach stations with caution only when there is reason to expect other trains there? The rule permits such an inference. Should not stations be approached with caution at all times, and should not enginemen act at all stations as if they expected to meet trains there? This rule as it stands is a mischievous one.

(*d*) 89.—"Brakemen * * * will be civil to all passengers, and give all proper information respecting their trains to those getting upon or leaving them, while they are on duty."

The inference here is, that when not on duty brakemen need not be civil.

Any person reading the instructions to "station agents" might with reason ask, "Who or what is a station agent?" From the rules it would appear that he is superintendent of the station, also ticket agent, also baggageman, also switchman. Although he might fill all the offices at a flag station, he would find some difficulty in doing so at a large depot; but the rules make no distinction.

While we find so many slovenly, though important rules, and a large number of unimportant regulations, we notice the absence of many rules not a whit less important than any one in the code. For instance, no mention is there of lamp signals, although the veriest tyro in the transportation department must appreciate the importance of a well-understood code of such signals, and must know the loss of property caused every now and then by the misunderstanding of a lamp signal. On some roads a lamp moved up and down is a signal to back, on other roads it is a signal to stop, on others, again, it means "go ahead." There is no description of the kind or number of lights engines are to carry. There are no rules regulating the rights or conduct of flagged trains, nor any as to the signals to be carried by each, when three or more are running in company. "Special orders" are mentioned, but there is no definition of a "special order," nor is it stated who has authority to give such. There is no provision for signifying to the train that an order awaits it. Many other important omissions might be noted if space permitted, which it does not. A writer in the Indianapolis *Journal*, some time back, referring to these "rules and regulations," alluded to the authors as Rip Van Winkles, and regretted that some Western managers had indorsed the puny effort so ostentatiously put forth, as "all that human foresight can suggest." This regret I echo.

HINDOO.

The Question "for Scientists."

GALESBURG, Dec. 27, 1872.

TO THE EDITOR OF THE RAILROAD GAZETTE:

In your issue of December 14 is a short article entitled "For Scientists." In this the author asks "why the western rail,' on a certain line of road laid north and south, should "creep faster than the eastern?"

I think the solution of this is in the fact that the bearings on which the eastern and western rails lay are not equal.

The standard length of ties for 4ft. 8½in. gauge is, say, 8 feet. This would leave about 1½ feet of the tie to project past the center of the base of the rail. In most cases, though the standard length for ties is 8 feet, you will find the majority to be over 8 feet, while some are not much over 7 feet long, thus making a great difference in the lengths.

In laying track these ties are almost invariably laid to a line, on one side, four feet from the center of the road-bed, while the other ends of the ties project much beyond a line four feet from the center of said road-bed, and while the short ties do not reach four feet from the center of the bed. Thus a very unequal bearing to the rail on the opposite side from the line is given; while, each tie on the "line-side" projecting the same distance from the center of the track-bed, that side of course receives an even bearing.

The principal cause of rails creeping is unevenness of the rail-bearing on the tie.

This manner of laying ties costs railroad companies more in the matter of repairs of track than any other one item of work which may not have been rightly done, as the unevenness of the rail-bearing causes rails to wear out faster and break oftener, and also causes track to go out of line. Ties, of whatever length, should be so laid that they will reach an equal distance each side of the centre of the road-bed, without regard to having one end laid to a line.

I think it will be found that the eastern side of the track mentioned in the article in the GAZETTE of December 14 is, or was, the line-side of said track.

JAS. T. CLARK,
Road-Master Chicago, Burlington & Quincy Railroad.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The conditions do not appear to be all given in order to decide why the western rails on some lines creep faster than the eastern, as asserted in your issue of December 14, 1782.

If you will, through the columns of the GAZETTE, inform your readers as to locality, and if the road is influenced by a water course and upon which side, if so, also whether a single or double track, a solution will be offered for the consideration of you and those interested.

January 3, 1873. S. H. F.

[We suppose the road meant by our contributor to be a single-track line, running nearly due north and south, and nowhere for any considerable distance being on the bank of a stream; but our grounds for so supposing is our knowledge that he is familiar with such a line.—EDITOR RAILROAD GAZETTE.]

Practical Field Engineering.

NO. XIII.

PRELIMINARY REMARKS ON TRESTLE BUILDING.

One of the most difficult of the many duties pertaining to that branch of the engineering profession under consideration in these papers is that of superintending the construction of timber trestles and bridges. Of course the limits of this article would preclude anything like an essay on the philosophy of bridge-building, if such a thing were not foreign to the idea of the author in preparing this series. Practical information touching his duties is what the inexperienced engineer deserves. The well-informed professional man, whose broad opportunities and varied experience in his business have rendered him an expert, will find nothing of great value to him in these papers, but perhaps his memory will turn to a time in the past when plain explanations of the simplest professional operations would have been eagerly and thankfully received.

Hewed timber is the best material for railroad trestles, and oak is the best available timber in most of our States. The heart of the Southern pine is much used in the Gulf States, and I am informed by a railroad builder of Cincinnati that he has used "shell-bark" hickory for plumb-posts and trestle-braces with fair success. In the Middle and Western States, white oak is most used and is by far the best timber for trestles and brace bridges. Next in value for such purpose comes the post oak of the Southern hill country. This tree resembles the white oak, but its timber is not so tough and elastic. The timber for ordinary railroad trestles may be divided and named in pieces as follows:

Caps, or plates, hewed on four sides and 12 inches by 12 at the cross-section.

Plumb-posts, same dimensions at the cross-section as above.

Batters, or braces, ditto.

Base-sills, ditto.

Mud-sills, hewed on two sides.

The four pieces first named, when properly put together, form what is termed a *bent*—that is, a simple bent is composed of 1 cap, 1 base-sill, 2 plumb-posts and 2 braces. When a bent is in position, its cap and base-sill are at right angles to the line of road on a tangent, and in the direction of radius on a curve.

The mud-sills are placed parallel to the line of road, and on these the base of the bent rests.

The best stringers are of oak, hewed on four sides and made 12×14 inches at the cross-section. These are made as long as your timber will readily admit of, and are placed on the caps in the direction of the line of road, for the purpose of supporting the cross-ties, which in turn support the track.

With the dimensions above given a safe trestle should have its bents not more than 12½ feet apart, unless the stringers are strengthened by longitudinal or intermediate braces, when the distance from bent to bent may be increased to 18 feet.

The form of a simple bent will be easily understood from the following description.

For the 4 feet 8½ inch gauge of track, the cap should be 10 feet long. Then, say your bent is to be 15 feet high, the distance between the bottom of your cap and the top of your base sill will be 13 feet, of course making your plumb posts 13 feet "in the clear." Now, the brace, or batter posts, are set at an angle with the plumb posts, the apex of the angle being the point where the outer side of the plumb post meets the cap, the brace thus forming a slope (like that of an embankment), say of ½ to 1. This much being known, to calculate the length in the clear of your braces, you have only to add together the square of the clear length of your plumb post and the square of the distance between the foot of your brace and the foot of your plumb post, and extract the square root of the sum. This explanation, and the general idea of trestle bents, will be readily understood and fastened on the student's mind, by an examination of a trestle, which, in this day of railroads, is an easy matter. The timber, then, of a 15 feet bent may be billed as follows:

1 Cap, 12 x 12 in.; 10 feet long.
1 Base-sill, 12 x 12 in.; 19.5 feet long.
2 Plumb Posts, 12 x 12 in.; 14 feet long.
2 Batter Posts, 12 x 12 in.; 15 feet long.

By making your calculations you will find that due allowance has been made in the above bill for the tenons by which the posts and batters are joined to the cap and sill. The calculation is for a batter slope of four inches to the foot. Where timber is very valuable less margin may be allowed for tenons.

The three principal objects to be aimed at in the construction of a railroad trestle are stability—that is, freedom from "shaking" or oscillation—economy in materials, and durability. These requisites depend greatly on each other. That is, stability is essential to durability, and generally it is economy to secure durability.

The railroad field engineer is not expected to be a practical carpenter and joiner or framer, but it is of the first importance that he should be able to judge, upon examination, of the carpenter work done on his line of road. Nothing connected with the construction of railroads is better calculated to insure frightful accidents than insufficient workmanship in the framing and erecting of trestles. The engineer must see that all hewed timber furnished by contractors is sound, *plumb*, that is, hewed straight with opposite faces parallel, and of uniform cross-section. All warped and spirally hewed pieces should be rejected, as well as those having doted knots and lines of "wind skake."

As soon as the bents of a trestle are framed, the joints must be examined to see that they fit snugly, and a careful measurement ought to be made in order to detect and remedy any error in the proportions of the work; for unless the bent is accurately framed, the strain to which it will be subjected during the passage of a train will not be properly distributed, and the consequence will be wrenching of the joints and great danger if not disaster.

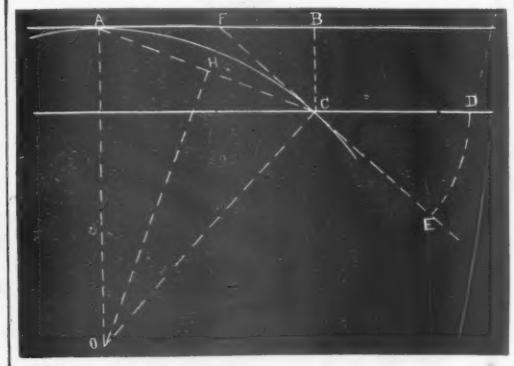
The engineer should personally superintend the preparation of proper foundations for trestle bents. A solid bed of clay or gravel is sufficient. Soil, unless very stiff and compact, should be removed and the mud-sills placed upon the subsoil, especially in a cold climate where the varying of weather temperature so seriously affects the condition of the ground surface.

More of trestles in the next paper. HOOSIER.

Locating Frogs.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Given as follows: $BC = 4.71$ft. = gauge, $AO = 716.78$ = radius; to find AC = the diagonal distance between the *heel of the switch* and the *point of the frog*, or AB, the parallel distance between the same two points; also to find the frog-angle $DCE = BFC = 2BAC$.



Since

$$AO : AH :: AC : BC$$

or,

$$R : \tfrac{1}{2}AC :: AC : \text{gauge}$$

then

$$AC^2 = R \times 2 \text{ gauge},$$

and

$$AC = \sqrt{R \times 2g} = 82.08 \text{ feet}$$

and

$$AB^2 = AC^2 - BC^2$$

or

$$AB = \sqrt{AC^2 - g^2} = 81.90 \text{ feet}$$

Since R is the radius of an 8-degree curve, then the angle BAC is equal to 4 degrees x 82.08 feet = 3° 16′ 30″, and the frog-angle, being twice the angle BAC, is equal to 6° 33′, about an 8¾ size frog.

To get the distance along the rail between the *toe of the switch* (or head-block) and a point opposite the *point of the frog*, we have the "*throw*" = 0.417, and say, as

$$\text{gauge} : AB^2 :: \text{throw} : x^2$$

or

$$x = \sqrt{\frac{AB^2 \times \text{throw}}{\text{gauge}}} = 24.48 \text{ feet}$$

and

$$AB - x = 81.90 - 24.48 = 57.42$$

and is the required distance; and x will be the length of the switch-rail.

In this manner, without a table of sines and tangents, we may find the frog-angle, the length of the switch-rail, and the parallel distance between the *toe of the switch* and the *point of the frog*, by having given the *radius*, the *gauge* and the *throw*.

Since the cotangent of the frog-angle is *very nearly* equal to its size, or number, or its ratio of length to width at the base, we may assume that it is the same.

Then

$$AB = BC \times \cot BAC$$

and, since the angle $BAC = \frac{1}{2}DCE$, its cotangent is *nearly* double the cotangent of DCE, and therefore

$$AB = \text{gauge} \times 2 \cot DCE$$

or,

$$AB = \text{gauge} \times 2 \text{ size of frog}$$

This is the formula met with in your issue of August 31 by "T," which I also found in *Engineering*, of January 16, 1872.

And, referring to the beginning of this article, we find

$$R = AC^2 \div 2g$$

From *Engineering*, of January 16, 1872, we get valuable formula for locating point of frog on turnouts from curves, and I give them here for the benefit of whom it may concern.

When the curves are of same radii and turn in opposite direction:

AB (for middle frog) = gauge × size of the outside frog

and

$$x = \tfrac{1}{2}\left(\sqrt{\frac{A\,B^2 \times \text{throw}}{\text{gauge}}}\right)$$

When curves are of different radii, and turn in opposite directions, let R = the longest radius, and R' = shortest radius, then

$$AB - x = 2 \text{ size of outside frog } \left(g\frac{R}{R+R'}\right)\left(1 - \frac{\sqrt{\text{throw}}}{\sqrt{\text{gauge}}}\right)$$

When curves turn in same direction:

$$AB - x = 2 \text{ size of outside frog } \left(g\frac{R}{R-R'}\right)\left(1 - \frac{\sqrt{\text{throw}}}{\sqrt{\text{gauge}}}\right)$$

Hoping these may be of some benefit to some fellow-craftsman, I remain, yours, etc., W. M. J.

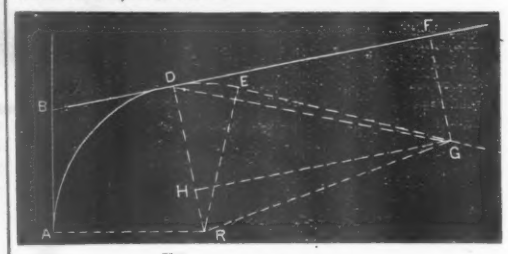
DALLAS, Texas, December 15, 1872.

Changing Curve for Different Tangents.

INTERCOLONIAL RAILWAY, CONTRACT 13,
QUEBEC, December 26, 1872.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Referring to the problem of R. O. B., in your impression of December 7th, about curves:



Nat. tan $FDG = \frac{FG}{FD}$; whence the angles FDG and RDG are known.

Sec. $FDG = \frac{DG}{FD}$; whence DG is known.

$(DR+DG)$ is to $(DG-DR)$ as tan ½ $(DRG+DGR)$ is to tan ½ $(DRG-DGR$; whence the angles at R and G become known.

Sec. $GRE = \frac{GR}{RE}$; whence the angle GRE is known; and deducting this angle from DRG already found, the remaining angle equals the curvature of DE. H. P. BILL.

The Kansas Central Railroad.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The Kansas Central Railroad was opened for traffic September, 1872. It is of three feet gauge; in its construction and equipment the principle of economy in first cost has been carried, probably, to the extreme limit; it runs through a country at once sparsely populated and presenting considerable physical difficulties. For these reasons it is an interesting case in the narrow-gauge problem. The line as built goes nearly due west from Leavenworth, across Leavenworth County and three-fourths of Jefferson County, thence northwesterly up the valley of the Grasshopper River, across a corner of Atchison County, and about eight miles into Jackson County to Holton. The length of constructed line is 56 miles and a small fraction. A branch has been located from Holton, northward about twelve miles, to Netawaka, on the Central Branch of the Union Pacific. Some reconnoisances have been made westward, with the avowed intention of continuing the line to Denver, Col., 600 miles further. The subscriptions for building the Netawaka Branch have already been forfeited, and those to continue the line westward through Jackson County must be lost by reason of the expiration of the time within which it was to have been completed to secure them; therefore, we may consider the road as, for the present, completed.

The cross-sections adopted in construction were, in filling, eight feet width of road-bed and slopes of one and one-half to one; in cutting, ten feet road-bed and slopes of one to one in loose earth, and considerably steeper in the clay and shales in which the heaviest cuttings were made. These dimensions have been found too small. The fills have already washed down, so that in many cases the ends of the ties have no support; while the width of the cuttings is entirely inadequate to the required drainage. Considerable repairs have already been necessary on this account. Moreover, when the iron was laid it was impossible to rectify the alignment upon the narrow embankments; but the center line of the embankments, as the contractors left them, necessarily became the center line of the track.

It is evident, and is acknowledged by the officers of the road, that the limit of economy in the cross-sections has been passed

The bridging is all of timber. There are 700 feet of Howe-truss bridge, in seven single spans of various lengths, four trussed girders of 45 feet each, and 1,500 feet of pile bridging.

In the pile bridging each bent consists of four piles, driven in a line transversely to the line of track, driven from ten to fifteen feet, and standing so high above the surface that they carry directly the caps upon which the track-stringers rest. All abutments or piers of the other bridges are of piles arranged in the same general way, except that in one instance the piers are of trestling. In no case is there any masonry. As a consequence of this use of piles to carry the superstructure, without the interposition of masonry or trestling, they stand in many cases with from one-half to two-thirds of their length

above the surface. It is not necessary to comment upon the stability or permanence of such structures.

The culverts are of timber or dry masonry. The cattle-guards are of timber, and never more than two feet deep. There is but one piece of wet masonry on the line—the abutments of a small road bridge over the track.

The ties are hewn six feet long, with six inches face. The iron is 28 feet long, of the Sandberg standard section, and thirty pounds to the yard. This has been found too light, and 35-pound iron was laid on the last few miles. Whether or not this last is heavy enough remains to proved. The joints are fished.

The maximum curve used is twelve degrees, and the line is extremely crooked. The maximum grade is 75 feet to the mile. There is a constant succession of short undulating gradients. Notwithstanding the free use of curves and heavy gradients in location, this is not often a surface line, but has much —comparatively light—cutting and filling.

The road is equipped with two Baldwin locomotives of twelve tons each, having four driving-wheels connected and single leading-trucks, and cylinders nine by six inches; one Baldwin locomotive of seventeen tons, with six driving-wheels connected, single leading-truck and eleven by sixteen cylinders; two passenger cars and two combined baggage and smoking cars, by the Jackson & Sharpe Company; 25 box cars, 38 flats, 9 stock and 10 four-wheeled coal cars. The freight cars are now mostly built by a Leavenworth company.

The passenger cars seat thirty-two persons. Possibly these cars may be as well ventilated and made as comfortable for a long journey as those of the medium gauge; certainly they are not so now. It may be well to mention here that the lateral oscillation of these cars, when moving at fifteen miles an hour, is much greater than that upon notoriously ill-conditioned roads of broader gauge, at twenty miles or more. How far this fact is due to the diminished gauge is an interesting question. The weights of the box cars are about 9,500 pounds; of stock cars, 8,500; and of the flats, about 7,000 pounds; and their working loads are fixed at eight tons.

The construction and equipment of the road as it now is cost, according to the statement of the Superintendent, Mr. Buchanan, $15,000 a mile. A liberal estimate makes the cost of the above equipment about $1,000 a mile.

The line is located throughout over high, rolling prarie. The eastern end is marked by high, abrupt swells, isolated limestone buttes and deep arroyas and waterways. Proceeding westward the line rises to the top of a plateau, where the swells are longer and gentler, the waterways insignificant and the limestone seldom shows in the cuttings. The western fifteen miles is up the valley of the Grasshopper River.

It is an ugly country to "locate" over, but an admirable one to display the relative economy of the reduced gauge, as a line can approach conformity to the contour of the land only by the boldest use of curves, and as at best there must be much earth-work.

Unfortunately, no fair comparison can be made of the cost of construction of the Kansas Central as it now is with that of a *first-class* road of any gauge; for the cross-sections are confessedly too small, the iron is acknowledged to be too light, and the timber substructure must be considered as at best but semi-permanent.

Perhaps it is too soon to expect from the Kansas Central any valuable data concerning the relation between the earnings and cost of operating of narrow-gauge lines. At least such data are still unattainable, because of the unwillingness of the officers of the road to publish them, or of their own want of accurate knowledge; probably for both reasons.

Their traffic is very light. They run two daily trains each way, the "mail" and the "mixed." The schedule times for the trains are: The mail, 14½ miles an hour; the mixed, 10 miles an hour. The mail train is composed of one passenger and one baggage car; the mixed, of one passenger car and from four to eight freight cars. Five through passengers for each train is a liberal estimate. The tariff is four cents a mile. The freight cars are said to be pretty constantly loaded one way.

It is impossible that the present traffic should pay the working expenses and the interest on the money invested; but it is not likely to increase rapidly or largely.

Leavenworth, Jefferson and Jackson counties are among the oldest and best settled counties of the State, and are growing steadily, but much more slowly than counties farther south and west. There is no doubt of the capacity of the country on the exist ng and proposed line to sustain a large population. It is well watered and timbered; is a superior grazing country, and yields fair crops of wheat and corn.

But it is a fact, now established by much experience, that a road in a new country cannot soon pay dividends from the way traffic which it develops. The case of the Kansas Central is no exception. Indeed, it must compete for what traffic it has now or shall have with the Central Branch of the Union Pacific, the Kansas Pacific and the Atchison, Topeka & Santa Fe.

There seems to be two ways in which it may, perhaps, become a financial success: By pushing on to Denver and competing with the roads above named and the Union Pacific in through trade for the West and Southwest; or by getting subsidies so great that it shall become profitable to merely build the road.

Perhaps the latter is the policy of the men controlling it. Certainly the road has been largely subsidized. It received from Leavenworth County $250,000 in bonds of the Kansas Pacific Railway; from Jefferson County, $170,000 (I believe), and from Jackson County $60,000 in county bonds. A further subscription of one hundred and seventy thousand from Jackson County, to complete the road through that county, will not be paid, as the road has failed to fill the conditions.

It is supposed that when these bonds are all negotiated the road will be carried further.

HENRY G. PROUT.

The American Society of Civil Engineers.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Your interesting article on the subject of the American Society of Civil Engineers requires reply from those who differ from you; and, as one of those who have advocated the formation of Chapters, I desire to give some reasons why I regard it as very important that the Society should extend itself in this way, rather than to remain a loose aggregation of scattered members, as it is now, and such as are the societies to which you referred as examples.

A consideration of the objects of the societies which you compare will reveal some reasons for their different organization. The Master Mechanics' Association is devoted to the improvement and perfection of a single machine, and questions by circular relating to the dimensions of its parts, and to their arrangement, have relation to the pursuits of all the members of the Association; each one has an experience to relate with reference to the object of their united study, the locomotive engine. So it is with the Master Car-Builders' Association; the members are all concerned with a special and limited class of subjects, upon which the attention of all is fixed.

It is quite otherwise with a society of civil engineers; a few only of its members are engaged in any one branch of engineering, of a special class like those of the master mechanics or master car-builders; it is rather to be preferred that they should not be confined to any classes, but represent the entire range of professional knowledge. The objects of the profession of engineering are not too broadly stated in the charter of the British Institution, where they are defined as "the adaptation of the powers of nature to the service of man. The members of such a society should be, as they are, somewhat informed in science; trained to thinking and writing. A part of their contributions are records of experience; others are devoted to the consideration of proposed schemes; others, and among the most useful, are mathematical investigations of problems. In work of this kind one thoughtful mind, devoted to the subject, will accomplish more than a committee.

Now, wherever there are studious and thoughtful engineers, new things will be discovered by observation, experience and reflection; yet, from the absorbing nature of professional duty, these will rarely be put on record or made known, except there be some special stimulus to the work which is necessary to execute the writing. This stimulus is afforded by the formation of a society for interchange of such experiences. It is supplied by a local society, but it comes in larger doses from a national one; and as very many of these writings are of value to the entire profession, it is desirable that they should not be lost in an endless number of minor series, but be brought together in the "Proceedings of the National Society."

I esteem the National Society as the means of cultivating an "esprit de corps," which shall exert its force in all quarters of of the country, and which, it seems to, me, will be greatly fostered by the formation in each city of chapters owing allegiance to a central body. For examples of the power of this form of association we may look at the Christian church, or at the society of Masons, or at the Odd Fellows, etc.

If I heard the report of the Committee on Chapters correctly, it was therein suggested that the members of Chapters should be *associates*, not *members* of the National Society, In their selection, I expect that a Chapter would be more discriminating than the distant National Society could be, and would afford all the advantages as a recruiting field for the National Society which your paragraph on the subject indicates as desirable.

The Chapters would certainly make the influence of the National Society more felt at a distance than it is now; the chartering of Chapters by the National Society, would, as it has seemed to me, promote the increase of local societies, and so stimulate the members of the profession to greater intellectual activity.

C. P.

Richmond & Danville Report.

This company owns a railroad from Richmond, Va., southwest to Danville, 140 miles, with a branch one and one-half miles long to Rockett's near Richmond, and operates also the Piedmont Railroad from Danville to Greensboro, N. C., 48½ miles, making 190 miles of track. There are also 13¼ miles of sidings. The company has also, since September, 1871, operated under lease the North Carolina Railroad from Goldsboro, N. C., west to Charlotte, 223 miles, but the receipts from that road are not included in the present report. The report of the President, presented at the recent annual meeting, gives the following statement of the business of the road for the year ending September 30, 1872:

EARNINGS.

From passengers	$268,199 05
From freight	514,647 90
From express freights	21,910 32
From United States mail	26,926 05
From telegraph line	417 66
From rents	2,359 93
Total	$834,451 91

EXPENSES.

For conducting transportation	$200,913 14	
For maintenance of roadway and real estate	176,212 22	
For maintenance of machinery	53,214 64	
For general expenses	40,266 32	
		$470,606 22
Net earnings		$363,845 69

The cost of operating the road is 56⅝ per cent. of the gross receipts. The increase in gross income for the year is $76,379.51, or 10½ per cent., and in net income $19,610.07, or 5⅝ per cent. The amount of freight transported was 178,708 tons, being an increase of 15,586 tons over the previous year, notwithstanding a decrease of over 3,000 tons in grain freights, owing to the short grain crop of last year. The gross earnings are at the rate of $4,392 per mile.

During the year about 12½ miles of new 56-pound rails have been laid, with fish-joints, and 21 miles of the road have been ballasted with gravel. It is intended to continue this work until the whole road is ballasted.

The operations of the North Carolina Railroad under the lease of last year have been satisfactory, and there is no doubt that that road will not only be self-sustaining, but will yield a profit to the lessees.

Measures are being taken to extend the connections and business of the road. The Roanoke Valley road from Keysville, Va., southeast to Manson, N. C., 52 miles, of which 31 miles is graded and bridged, has been purchased during the year by parties friendly to this company, and a new company has been organized entirely in the interests of the Danville road. Arrangements have been made for the speedy completion of the road.

The Northwestern North Carolina road, from Greensboro, N. C., to Salem, about 30 miles, was graded during 1870, but the company was unable to complete the work. In March a contract was made by which the Richmond & Danville Company agreed to complete and operate the road, receiving 1,600 shares (a majority) of the stock and $500,000, being the whole issue, of the first-mortgage bonds of the Northwestern North Carolina Company. About one-half the track is now laid, and work is proceeding rapidly.

A great increase of business is hoped for from these connections and also from the approaching completion of the Atlanta & Richmond Air Line road, from which most of the through business will pass over the Richmond & Danville road. The local traffic of the road is increasing and a prosperous year is anti ipated.

On the Strength and Proportions of Riveted Joints, With the Results of Some Recent Experiments.

[Paper read before the Institution of Mechanical Engineers by Mr. Walter R. Browne, of Bristol, at the meeting in Birmingham, England, January 25, 1872.]

[CONCLUDED.]

SINGLE-RIVETED BUTT JOINTS.

The next portion of the subject to be investigated is the proportions of butt joints, in which the two plates are connected by means of cover-strips riveted to each plate; and these covers are either on one side only, as in Figs. 14 and 15, or on both sides, as in Figs. 16 and 17.

Single-Riveted Butt Joints.

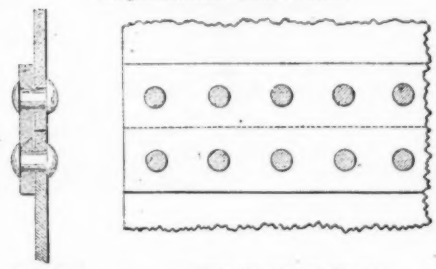


Fig. 14. *Fig. 15, Single Cover.*

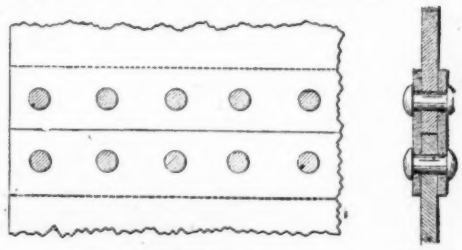


Fig. 16, Double Cover. *Fig. 17.*

In the case of a single cover, each half of the joint is in effect simply a lap-joint, the cover representing a separate plate; consequently the proportions previously obtained apply in this case, as shown in Figs. 14 and 15, whether the joint be single riveted or double riveted. It follows also that the thickness of the cover should be the same as that of the plates.

Next with double covers, as in Figs. 16 and 17, the thickness required for each of the two cover strips is only half that of the plates, as they must both of them tear if the joint gives way. In this case there is the peculiarity that if the joint gives way by the failure of the rivets it must do so from their shearing in two places instead of one; and as double the area has then to be sheared, the equation previously employed becomes

$$2\,S \times \cdot 7854\,d^2 = P \times t\,d$$

or the proportion of diameter of rivet to thickness of plate is

$$\frac{d}{t} = \frac{P}{1.57S}$$

In this expression the values have to be ascertained from experiment for P, the resistance of the plate to crippling, and S, the shearing strength of the rivets, both in tons per square inch. From the experiments made by the writer on the resistance to crippling in butt joints this amounts to a mean of 42·9 tons, as shown in Table I appended, or say 43 tons per square inch for the value of P.

In reference to the value of S, the experiments on record upon the resistance of rivets to double shear present considerable discrepancies, as in the case of those previously referred to upon the resistance to single shear; and the results range from 16·8 to 22·3 tons per square inch. The several values in the experiments are

Mr. H. Sharp	18·68	tons for Single shear	16·80	tons for Double shear
Mr. Doyne	18·82	"	17·55	"
Mr. Maynard	26·50	"	19·60	"
Mr. Reed	22·70	"	20·37	"
Mr. Brunel	.....	"	21·00	"
Mr. Clark	20·40	"	22·30*	"

In Mr. Sharp's experiments there is one case bearing on the present question which gives the above value of 16·8 for S, but for the reason named before this is probably too low. Mr. Reed's result of 20·37 is obtained from the shearing strain of a ¾-inch rivet in double shear. As the experiments by Mr. Brunel were made with plates ¾ and ½ inch thick and 20 inches wide, admitting five rivets in a row, considerable confidence

* This is apparently the result of a single experiment only, and is no doubt unduly high.

may be placed in their results; and in two of these, bearing directly on the present question, in which seven and ten rivets respectively were sheared, the results were 21·1 and 20·9, averaging 21 tons per inch. In two other experiments, in which the plates tore between the rivet holes, the ultimate strain on the rivets gave a value above 22 tons for S. On the whole the best value to be taken appears to be 21 tons per square inch for the shearing strength of the rivet in double shear, in place of the 22 tons per inch previously determined for the case of single shear.

Taking then the values $S = 21$ and $P = 43$, the result obtained is

$$\frac{d}{t} = 1{\cdot}30$$

or say 1¼ times for the proportion of the diameter of rivet to the thickness of plate, giving a slight advantage to the plate.

In the next place, to find the distance of rivet from edge of plate, the equation will be the same as before for a lap joint, except that the resistance to shearing has to be doubled; the equation therefore becomes

$$2\,S \times {\cdot}7854\,d^2 = Q \times \frac{t\,a^2}{d}$$

The value of Q will be the same as before, namely 38; also $S = 21$, and $d = 1\frac{1}{4}\,t$; the result obtained is consequently

$$\frac{a}{d} = 1{\cdot}04$$

or the distance of rivet from edge of plate is practically equal to the diameter, the same as in the case of lap joints. This proportion applies both to the plates and the cover strips, and holds substantially even if the ratio of diameter to thickness be somewhat less than 1¼ times. The amount of the lap for the cover strips will therefore be 3 diameters on each plate, making the width of the cover strips equal to 6 diameters.

Then to find the pitch; as the plate may tear across the rivet holes just as before, the equation will be the same, except that the resistance to shearing has to be doubled, and the equation becomes

$$2\,S \times {\cdot}7854\,d^2 = R \times 2\,b\,t.$$

The value previously taken for the tearing strength R, namely, 18 tons per inch, agrees with Mr. Brunel's experiments, in all of which the joints were of this description; and it may therefore be safely taken for the present case. Then, taking the other values the same as before, namely, $S = 21$, and $d = 1\frac{1}{4}t$, the result obtained is

$$b = 1{\cdot}15\,d,$$

or the pitch is equal to 3¼ diameters.

The rules thus obtained for the proportions of single-riveted butt-joints with double covers and punched holes are therefore, as shown in figs. 16 and 17:

Diameter of rivets	= 1¼ times thickness of plate,
Pitch	= 3¼ diameters,
Width of cover strips	= 6 diameters.

The proportionate strength of the joint, as compared with that of the entire plate, is $\frac{18}{22} \times \frac{2{\cdot}25}{3{\cdot}25}$ or 57 per cent. with punched plates.

For drilled plates the tearing strength has to be taken at the full tensile value of 22 tons, instead of 18, and then

$$b = 0{\cdot}94\,d.$$

The result thus obtained is pitch = 3 diameters, and the corresponding proportionate strength is ¾ or 67 per cent. of that of the entire plate.

DOUBLE-RIVETED BUTT-JOINTS.

The last form of joint to be considered is that of a butt-joint with two cover strips, each doubly riveted, as in figs. 18, 19 and 20. The thickness of the cover strips will, as before, be half the thickness of the plates.

In this case the proportion of diameter of rivet to thickness of plate is the same as in the previous single-riveted joint, or 1¼ times the thickness, the rivets being under the same circumstances of strain in both cases.

Then, to find the distance between the two rows of rivets and the distance of the outer row from the edge of the plate, the conclusions previously arrived at for double-riveted lap-joints apply fully to the present case, as the experiments by Mr. Brunel upon which they are chiefly founded were made with double-riveted butt-joints. Consequently, the width of the cover strips is double the lap previously ascertained, or 11 diameters in chain riveting, as in fig. 19.

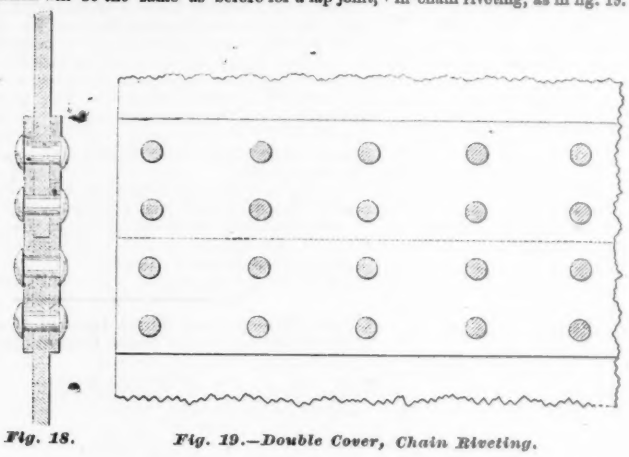


Fig. 18.

Fig. 19.—Double Cover, Chain Riveting.

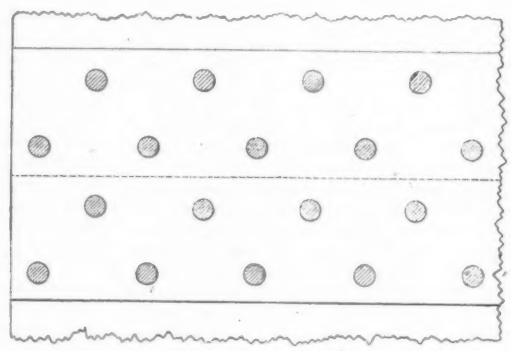


Fig. 20.—Double Cover, Zigzag Riveting.

RIVETED JOINTS

Fig. 21 *Diagonal-Joint Boiler*

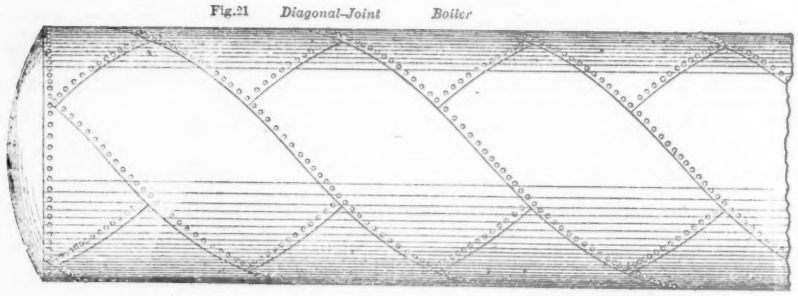
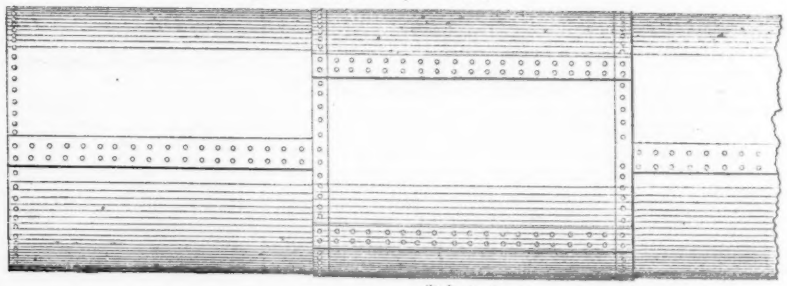
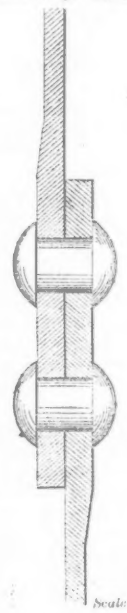


Fig. 22 *Thickened-Edge Plates*



Scale ½ in.

Fig. 23 *Section of Thickened-Edge Plates*



Scale ½ in.

Last, to find the pitch, the calculation is the same as for single-riveted joints, except that double the number of rivets have to be sheared, and the equation consequently becomes

$$2\,(2\,S \times {\cdot}7854\,d^2 = R \times 2\,b\,t$$

and, taking $R = 19\frac{1}{2}$, as with double-riveted lap-joints, and $S = 21$, the result is

$$b = 1{\cdot}69 \times \frac{d}{t} \times d,$$

and if $d = 1\frac{1}{4}t$, then

$$b = 2{\cdot}11\,d,$$

thus making the pitch equal to 5¼ diameters. The distance between the pitch lines in zigzag riveting being, as before, two-thirds of the pitch, the width of the cover-strips becomes 18 diameters in zigzag riveting, as in fig. 20.

The rules for double-riveted butt-joints with double cover strips and punched holes are, therefore, as shown in figs. 18, 19 and 20:

Diameter of rivet	= 1¼ times thickness of plate,
Pitch	= 5¼ diameters,
Width of cover strips	= 11 diameters in chain riveting,
	= 13 diameters in zigzag riveting.

The proportionate strength of the joint is $\frac{19{\cdot}5}{22{\cdot}0} \times \frac{4{\cdot}25}{5{\cdot}25}$, or 72 per cent. of that of the entire plate, with punched holes.

For drilled holes, make the same correction as before, by putting the full value of 22 tons for R, the tearing strength, instead of only 19½ tons, the equation becomes

$$b = 1{\cdot}87\,d,$$

whence the pitch is equal to 4¾ diameters, and the proportionate strength of joint is $\frac{3{\cdot}75}{4{\cdot}75}$, or 79 per cent. of that of the entire plate.

CONCLUSIONS.

The results of the foregoing investigation into the proportions for the different descriptions of joints are shown in Table II appended; and are now offered for consideration, not as any final conclusion upon the subject, but simply as a fair deduction from the materials at present available. There are, however, many points on which information is meagre, and many on which it is wanting altogether; and the writer would feel great pleasure in seeing a revision of these results, by means of some thorough course of experiments on a sufficiently large scale.

It has to be observed that all the experiments upon which the results have been based were made with actual rivets and riveted work; so that all incidental considerations, such as alteration in the iron by the process of riveting, or friction of the rivet heads, are virtually included in the results.

One conclusion that appears to arise from the present investigation is that the advantage as regards strength in butt joints, even with double cover-strips, is very light over lap joints, the proportionate strength of the joint to the entire plate being increased only from 69 to 72 per cent. in double-riveted punched plates. The reason for this appears in the tendency to crippling that is shown in the writer's experiments, in relation to which the plate is virtually as weak in the case of the butt joints as in the lap joints. If this view be correct, it would seem that a useless expense is incurred in employing butt joints for boiler work, so far as strength of joint is concerned.

Another conclusion from the investigation appears to be that, in double-riveting, chain is preferable to zigzag riveting, being equally strong and requiring a smaller width of lap or cover-strip; and this plan was also the one recommended by Lloyd's Committee.

Lastly, a circumstance that especially attracts attention is the proportionate weakness of all the descriptions of joint as compared with the strength of the plates. In the best instance the strength of the joint is less than four-fifths of that of the plate, so that 20 per cent. of the whole iron in a boiler is wasted so far as strength is concerned; even this result is only obtained by the expensive process of using two cover-strips and drilling all the rivet holes. In a common single-riveted lap joint with punched holes the proportion of strength is only 55 per cent., or little more than half that of the plates. This serious waste of material requires consideration as to the means of reducing the amount.

In considering the strains on a boiler from internal pressure, it has to be borne in mind that in all cylindrical boilers the strain upon the transverse joints is only one-half of that upon the longitudinal joints. The strain per inch run on the longitudinal joints is proportional to the radius of the boiler, while that on the transverse joints is proportional to the area of the transverse circle of the boiler divided by the circumference of the same circle, which amounts to half the radius, instead of the whole radius, as in the other case of the longitudinal joint; and the strain on the transverse joints is consequently only one-half of that on the longitudinal joints, per inch run of each. This circumstance does not appear to have received the attention it requires, as boilers are generally made with the same description of joint in both directions; and thus the very unsatisfactory condition arises that, although the plates in boilers are subjected to a strain on their longitudinal edges double of that which is acting upon their transverse edges, yet they are united together by the same strength of joint at each edge, this joint having an effective strength little greater than half that of the plates.

Two modes are known to the writer for remedying this inequality in the strength of the joints. One of these is the diagonal-jointed boiler of Messrs. Wright, shown in fig. 21, in which the lines of joint, instead of running transversely and longitudinally, are ranged diagonally across the boiler. Taking the angle of the joints at 45 deg., and considering any square portion of the boiler surface of which the joint forms a diagonal, it will be seen that instead of the two pairs of equal and opposite tensions, one pair double in amount of the other pair, which would act on the sides of the square in ordinary square jointing, there are with the diagonal jointing two equal and

opposite resultant tensions acting across the diagonal joint. The resultant tension per inch run of the joint is found on calculation to be about four-fifths of the greater tension, and it acts not exactly at right angles to the joint, but at an angle of about 72 deg. with it. The latter circumstance, however, does not materially affect the result, and the tension on the diagonal joint may therefore be taken at four-fifths of that on a longitudinal joint; consequently the effective strength of the joint and of the boiler is increased in the ratio of four to five. Thus in a punctured lap-joint, if single-riveted, the proportionate strength of joints as compared with that of the entire plate is increased from 55 to 69 per cent., and if double-riveted from 69 to 86 per cent. The diagonal joints have in most cases to be replaced by transverse seams at the ends of the boiler; but as the tension on a transverse joint is only one-half of that on a longitudinal one, this does not form any objection. The writer is not aware whether any practical difficulties as regards workmanship and expense attends this diagonal construction of boiler; but so far as strength goes, it certainly seems to possess advantages that should not be overlooked.

The other mode of remedying the inequality in the strength of the transverse and longitudinal joints, is by the use of plates thickened along two opposite edges, as shown in Figs. 22 and 23; such plates may be rolled without any great practical difficulty, and are in fact rolled at the Low Moor Works and elsewhere, the thickening being produced along the two sides of the plate. Taking the case of plates ⅜ inch thick, and rolled with edges thickened to ½ inch; when these thickened edges are placed lengthwise in the boiler and double-riveted, the proportion of strength for the longitudinal joints compared with the body of the plate will be $1\frac{1}{2} \times 69 = 92$ per cent. For the transverse joints, as the tension is only half as great, a single-riveted lap-joint with a proportion of strength of 55 per cent. will be quite sufficient. There does not seem anything objectionable in such a construction of boiler, the only inconvenience being where the thickened edge of a plate passes under the adjoining plate at a transverse joint, which would require the corner to be drawn down for the purpose. This plan admits of making any boiler of equal strength throughout, without the necessity either of butt-jointing or of drilling the rivet holes. An advantage attending the use of thickened-edge plates is in reference to the ordinary corrosion at or near the joints, which is so fruitful a source of boiler explosions. The depth of this corrosion does not depend upon the thickness of the plates and would be no more for a ½ inch than for a ⅜ inch plate; but it migh produce an explosion with the latter, where the former would continue safe.

TABLE I.

EXPERIMENTS ON RIVETED JOINTS.

Lap Joints, Single-riveted.

Brand.	Plates. Size. Ins.	Total Breaking Strain. Tons.	Resistance. Tension. Tons p. sq. in.	Mean.	Crippling. Tons p. sq. in.	Mean.
K B C	13.20 × .32	33.20	10.26		33.57	
do	13.10 × .31	36.38	11.90	11.74	38.55	37.93
do	13.00 × .32	40.14	12.66		40.59	
do	13.00 × .32	38.56	12.16		38.89	
B W Best C	13.10 × .32	39.00	12.18		39.44	
do	13.00 × .31	37.00	12.04	12.06	38.63	38.82
do	13.00 × .31	36.76	11.97		38.38	
B B H	13.10 × .31	40.08	12.92		41.85	
do	13.10 × .30	39.09	13.02	12.95	42.17	41.81
do	13.00 × .30	38.37	12.91		41.40	
Mean	.....	.....	.....	12.25		39.52

Butt Joints, with two covers, Single-riveted.

Brand.	Plates. Size. Ins.	Total Breaking Strain. Tons.	Resistance. Tension. Tons p. sq. in.	Mean.	Crippling. Tons p. sq. in.	Mean.
K B C	13.10 × .32	41.20	12.86		41.67	
do	13.10 × .33	43.58	13.19	12 97	42.73	42.07
do	13.15 × .31	40.06	12.85		41 82	
B W Best C	13.10 × .30	38.01	12.66		41.01	
do	13.10 × .32	42.13	13.15	12.83	42.61	41.44
do	13.00 × .31	38.98	12.69		40.70	
B B H	13.00 × .30	39 81	12.39		42.94	
do	13.10 × .32	45.78	14.29	13.98	46.30	45.16
do	13.12 × .31	44.30	14.25		46.25	
Mean	.....	.....	.....	13.26		43.89

All the experiments were made with plates joined by three rivets of 1.03 inch diameter, 3 ins. pitch in the lap joints, and 3½ ins. pitch in the butt joints.

TABLE II.

Rules for Proportions of Riveted Joints.

Description of Joint.	Riveting.	Rivet holes.	Proportions. Diameter to Thickness.	Lap or Cover to Diameter.	Pitch to Diam'tr	Pct. Strength of J't to Plate
				Lap.		
Lap	Single	Punched	2	3	3	55
		Drilled	2	3	2¾	62
				Chain. Zig.		
Lap	Double.	Punched	2	5½ 6	4½	69
		Drilled	2	5 5½	4	75
				Cover.		
Butt, 1 cover.	Single	Punched	2	6	3	55
		Drilled	2	6	2¾	62
Butt, 1 cover.	Double.	Punched	2	11 12	4½	69
		Drilled	2	10 11	4	75
Butt, 2 covers	Single.	Punched	1¼	6	3¼	57
		Drilled	1¼	6	3	67
Butt, 2 covers	Double.	Punched	1¼	11 13	5¼	72
		Drilled	1¼	10 12	4¾	79

TABLE III.

Mean Experimental Values for Constants.

P	Crippling strain	lap joints	40 tons p. sq. in.
		butt joints	43 "
S	Shearing rivets	single shear	22 "
		double shear	21 "
Q	Tearing rivets out of holes		38 "
R	Tearing strength of plate between rivet holes	single riveting, punched holes	18 "
		single riveting, drilled holes	23 "
		double riveting, punched holes	19½ "
		double riveting, drilled holes	23 "

In conclusion, the writer would express a hope, in submitting these results to the institution, that they may not be considered superfluous or out of place, on the ground that practical experience affords the means of designing riveted joints sufficiently well, without having recourse to theory. For, on the contrary, cases have occurred of joints designed in that way which have shown on testing a proportion of strength considerably under 50 per cent. of that of the body of the plate, although supposed to be based on sound practical principles; and the serious consequences arising from defective construction of joints, in the explosion of boilers or leakage of ships, show the importance of the most complete investigation of the subject.

[An interesting discussion, the publication of which we will begin next week, followed the reading of this paper.—EDITOR RAILROAD GAZETTE.]

CHICAGO RAILROAD NEWS.

Chicago, Burlington & Quincy.

The stockholders of this company voted December 24, to lease the Burlington & Missouri River Railroad, and the lease went into effect January 1. W. B. Strong, Assistant General Superintendent and General Freight Agent of the Burlington & Missouri River Railroad, has been appointed Assistant General Superintendent of the consolidated lines.

The stockholders of this company and of Burlington and Missouri River road will have a joint meeting in Burlington, on the 14th, to consummate the arrangements for a consolidation of the two lines.

This company will probably open a new route between Chicago and Peoria, using the new Chicago, Pekin & Southwestern Railroad in connection with its Fox River Valley Branch and main line from Streator to Chicago, and at the lower end the 19 miles of the Toledo, Peoria & Warsaw Railway between Eureka and Peoria. This line is 156 miles long, and the line to Pekin is eight miles longer.

Chicago & Paducah.

Track has been laid on this road to Monticello, connecting with the Indianapolis, Bloomington & Western Railway. Including the 42 miles from Windsor to Monticello, and the 33 miles from Fairbury to Streator, the company has 75 miles completed. Between these two sections of road there are 52 miles, all of which is graded and bridged, and the iron will be laid at the earliest practicable moment in the spring.

New Appointments.

Mr. W. A. Thrall, Assistant General Passenger Agent of the Illinois Central, has been appointed General Ticket Agent of the Chicago & Northwestern Railway, in place of Mr. H. P. Stanwood, the latter taking the office of General Passenger Agent in the Chicago & Northwestern, which is a new official position. The place occupied by Mr. Thrall has not yet been filled. H. B. Ledyard has been appointed Assistant Superintendent of the Chicago, Burlington & Quincy Railroad with the duties of the late Division Superintendent at Chicago.

Chicago & Illinois River.

The surveyors of this company are busy running the lines of the road, and the company will rent an office centrally in the city soon, and will commence active operations.

A Case of Classification.

A certain road leading west from this city sent a report of its earnings, as required by the Board of Railroad and Warehouse Commissioners, and got a circular from the Secretary of the Board cataloguing the road in "Class D," and informing the President that he must post up at the several stations the distances between each station, and the fact that not over five and a half cents per mile for each passenger would be charged. The fact is that not only has the road in question never charged over three and a half cents per mile between stations, but if more than that should be charged, owing to the competition of rival roads, it would get no passenger business of any account. Probably some time the people will learn that competition has something to do with railroad earnings as well as with most other kinds of business, and that arbitrary and senseless rules of regulation and classification of railroads, such as exist in Illinois at present, only tend to indicate ignorance in the law-making department of the State.

The Chicago Railroads and the Snows.

Probably few roads in the country have been so free from accident or disaster during the last three weeks as the great lines centering in Chicago. Passenger trains have, except on one day, been almost always on time, and if freight has been delayed it has been on account of obstacles and delays at the East, over which these roads had no control. The Central reports trains on time with one or two slight exceptions, and no disasters. The Lake Shore & Michigan Southern road also reports a similar good state of things.

Chicago & Northwestern.

The first train on this company's new Chicago & St. Paul line left Chicago at 9 p. m. on the 3d inst. This route is by way of the Chicago & Northwestern through Madison to Elroy, Wis., and thence over the West Wisconsin, and its total length is 403 miles, against 441 by the old route *via* Milton Junction and Prairie du Chien line of the Milwaukee & St. Paul. By the new route, 196 miles of the Northwestern is used, by the old one only 99. The route now on the Northwestern section of the line is on the Wisconsin Division from Chicago northwest 63 miles to Harvard; thence over the Kenosha Division west by south 16 miles to Caledonia, thence on the Madison Division northwestward to Elroy, 118 miles. Two trains run daily over this line, with sleeping cars through to St. Paul. One leaves at 10 a. m. and the other at 9 p. m.

Chicago, Millington & Western.

This company has recently been organized under the general railroad law of Illinois, and purposes to build a railroad from Chicago southwest to Millington, on Fox River, 20 miles below Aurora, and thence through the coal fields of La Salle and Peru to Princeton, in Bureau County. From Princeton, the route to the Mississippi is still undecided. The first board of directors is as follows: Hon. Julian S. Rumsey, of Chicago, President of the Corn Exchange National Bank and Treasurer of Cook County; Lewis Steward, Piano, Ill.; Hon. J. W. Eddy, Millington; James Barton, Peru; Stephen J. Paddock, Princeton. There is some talk of building a road of three feet gauge.

Chicago & Westward Suburban.

This company has filed its certificate of incorporation in the office of the Secretary of State at Springfield, Ill. The capital is to be $30,000, and the company intends to build a railroad from Chicago, west to the town of Proviso in Cook County, 16 or 17 miles.

Chicago & Southwestward Suburban

This company, which has recently filed its certificate of incorporation in the office of the Secretary of State of Illinois, intends to build a railroad from Chicago southwest to Joliet. The capital stock will be $800,000.

Milwaukee & St. Paul.

This company will be ready to receive freight in this city in about ten days. It will complete this week the connection of its road with its freight house in this city. At the crossing of Halsted street it will be obliged to sink its track about ten feet below the street grade, interfering with the Milwaukee avenue street cars for a short time. That work will be done this week.

Pittsburgh, Fort Wayne & Chicago.

Mr. R. C. Moldrum, General Western Freight Agent of this road and also of the Black Star Line has removed his office from No. 9 West Madison street, to the premises occupied before the fire, northwest corner of Randolph and La Salle streets, in the Metropolitan Block. The company advertises for proposals for grading 6½ miles for second track from Valparaiso northwestward to Wheeler, Ind.

Chicago & Alton.

The earnings of this road for the year 1872, were $5,164,896.95, being a decrease from the earnings of 1871, of $114,013.28. The earnings for the month of December are estimated; but the official report will vary the figures but slightly. The company finds its business so much interrupted at Louisiana by ice in winter, that it has decided to span the river at that point by a bridge. At present the company is laying a new track on the east side of the Missouri River opposite Louisiana, Mo., to a crossing point two miles above the one now used. This will a give crossing in deeper water, where the transfer boat can run in almost any weather. Last winter there were considerable delays by the river freezing at the crossing, but throughout the severest weather the river was open at the point chosen for the new crossing.

Chicago Horse Railroads.

The street railroad companies have each declared dividends upon the earnings of last year equal to 15 per cent. upon the capital. The West Division Company has paid within the year a dividend of 20 per cent., but 5 per cent. consisted of a balance of the surplus of 1871.

Chicago, Danville & Vincennes.

The St. Louis & Southeastern Company has now a large transfer boat to transport freight across the Ohio River at Evansville. At the present time freight and passengers are transferred by this boat between Henderson and Evansville, a distance of about 12 miles. There is a movement on foot, which is likely soon to be realized, to build a railroad from Henderson, on the south bank of the Ohio, to a point opposite Evansville, thus forming a connection with the southern system of roads. The Chicago, Danville & Vincennes road is attracting much attention at the present time as being a line which is to develop the magnificent coal fields of Indiana, as well as open to the Chicago markets a large tract of country in Illinois heretofore practically unaccommodated with a railroad connection to this city.

PERSONAL.

—Col. Edward Loraine, Chief Engineer of the James River & Kanawha Canal, a native of New Orleans, died in Richmond, Va., on the 30th of December.

—Mr. E. H. Coffin has resigned his position as General Ticket Agent of the Kansas Central Railway, to accept the passenger agency of the Missouri Pacific Railroad at Kansas City, Mo.

—Mr. J. G. Butterfield, Master Mechanic of the St. Paul & Sioux City Railroad, has resigned his position. Mr. Butterfield has purchased a large tract of wheat land and intends to engage in farming.

—Mr. Edward Lorraine, Chief Engineer of the James River & Kanawha Canal, who died of small-pox at Richmond, Va., December 30, had been connected with the engineering department of the canal since 1839 and had been Chief Engineer since 1854.

—Mr. D. K. Smith, Assistant Superintendent of the Toledo, Peoria & Warsaw Railroad, was presented with a handsome gold watch and chain at his residence in Peoria on Christmas day by a number of the employes of the road.

—Mr. J. S. Lazarus, General Western Agent of the Toledo, Wabash & Western Railway, was presented with a handsome watch and chain, December 25, by the ticket agents at Kansas City, Mo.

—Mr. George W. Barkdoll, Conductor on the Perkiomen Branch of the Reading Railroad, was the fortunate recipient of no less than seven large turkeys from friends along the road on Christmas day.

—Mr. William Gidley, Roadmaster on the Toledo, Wabash & Western Railway, died of small-pox at his home in Litchfield, Ill., December 20.

—Walter M. Conkey, Treasurer of the New York & Oswego Midland Railroad Company from its organization, and President of the Bank of Chenango for the past twenty-five years, died, January 5, at Norwich, N. Y., of apoplexy. He was winding a clock, and fell back dead.

—Mr. George H. Griggs, who lately resigned his position as Master Mechanic of the Flushing & North Side Railroad, did so in order to take charge of a private manufacturing establishment.

—Mr. George L. Walker, of Rock Island, Ill., has resigned his position as Train Dispatcher on the Rockford, Rock Island & St. Louis Railroad. The officers and employees of the road presented a handsome testimonial to Mr. Walker. He has accepted a position on the Union Pacific road.

—The various rumors which have been in circulation to the effect that Mr. F. Wolcott Jackson had resigned his position as Superintendent of the United Railroads of the New Jersey Division of the Pennsylvania Railroad have been contradicted. Mr. Jackson still holds his position, and will continue to do so, for the present, at any rate.

THE SCRAP HEAP.

American Locomotives in Russia.

The *Russian News* reports the experiments made between St. Petersburg and Laubane, November 25, with a Baldwin locomotive made to burn anthracite coal. With a train of ten cars it passed over the heaviest grades at the rate of 60 verats (10 miles) an hour, and burned in running 130 verats (86 miles) 62 poods (2,232 pounds) of anthracite. These engines, it is believed, will be of great service in the south of Russia, where there are unworked mines of anthracite and very little wood, but where heretofore wood has been burned. *La Bourse*, of St. Petersburg, also reports the trial, and describes the construction as follows: "The frame is solid instead of being of plates, the construction of the cylinders, the manner in which they are adapted to the machine, and the mechanism of all the details which enter into the construction of a locomotive excel anything of the kind ever seen. But the most striking feature is the immense fire-box, about nine feet long, which forms the essential part of the system of heating with anthracite. Grates formed of several ranges of tubes, one above the other, extend from front to rear in the furnaces. These tubes communicating with the water-spaces, the water circulates in them constantly, so that the interior walls are protected against the consequences of the intense heat produced by the combustion of anthracite. * * * The engine worked wonderfully well all the time, and it was noticed that there was no heating of the journals, such as is common in all new locomotives."

RAILROAD GAZETTE

Published Every Saturday.

A. N. KELLOGG & CO., *Proprietors.*

S. WRIGHT DUNNING AND M. N. FORNEY, *Editors.*

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Editorial Announcements.

Correspondence.—*We cordially invite the co-operation of the railroad public in affording us the material for a thorough and worthy railroad paper. Railroad news, annual reports, notices of appointments, resignations, etc., and information concerning improvements will be gratefully received. We make it our business to inform the public concerning the progress of new lines, and are always glad to receive news of them.*

Inventions.—*No charge is made for publishing descriptions of what we consider important and interesting improvements in railroad machinery, rolling stock, etc.; but when engravings are necessary the inventor must supply them.*

Articles.—*We desire articles relating to railroads, and, if acceptable, will pay liberally for them. Articles concerning railroad management, engineering, rolling stock and machinery, by men practically acquainted with these subjects, are especially desired.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

MECHANICAL DRAWING.

There are few things for which people pay so unwillingly as for ideas. If we were without human experience, or had never observed the conduct of our fellowmen, this fact might surprise us, in view of the proneness for falling into error which they have manifested from that very remote time "to which the memory of man runneth not to the contrary." Even if we are unconscious of the usually very unwarrantable confidence which most of us have in the wisdom and shrewdness of our own opinions, we must nevertheless have observed it in other people, especially our own acquaintances. For this reason, then, most persons think they are quite competent to form their own opinions, even on subjects concerning which they are quite ignorant. Quite curiously, too, the more ignorant people are the less do they value ideas. An ignorant laboring man, who earns his bread literally by the sweat of his brow, is almost sure to regard as a great injustice the charge made by his physician for consultation and prescription, and it is equally difficult for him to understand why he should pay so much for legal advice, in order to secure what is justly due him. Comparatively a small number of the men who build houses are willing to pay for drawings and plans; and we never yet, after a good deal of experience, met a person who was willing to pay to be advised intelligently *not* to invest money in a foolish scheme, project or patent, although such advice might prevent great loss and disappointment to him. There is something intangible about the idea of a thing, and, in a very loose kind of way, most people seem to think as the sculptor did about his block of marble and the statue, when he declared that the statue always existed in the marble and that all he did was to peel off the outside. Now those who build railroads are often quite unable to understand why they should pay an engineer a large sum for locating a road in a position which, in a vague kind of way, they feel has always existed, and only needs to be selected as the position in which the road shall be built. Neither the laboring man, nor the builders of houses or railroads, can or will realize that the idea has any tangible value. Now the same thing is often true of the estimate made of the value of plans and drawings of machinery or other structures. Those who handle only the ledgers and checkbooks of any project, and are unacquainted with the processes by which all complicated structures are produced, often cannot see any necessary connection between the drawings of a machine and the machine itself. We believe that we state the experience of many engineers and master mechanics in saying that the expense of draftsmen is one which those who hold the strings of the money-bags are very unwilling to pay. Nor is the feeling that such services are superfluous confined alone to those who guard the treasury of engineering projects. It has been said that no one is ever known to object to a degree of theoretical knowledge of which he is possessed himself. It might also be said, with equal truthfulness, that no engineer or mechanic who is a good draftsman ever objects to skillfully made drawings. Those who do not recognize the value of good drawings are always men who are quite ignorant of the art of making or comprehending them. There are many very excellent mechanics who can understand a machine if they see it, but are quite unable to tell its construction or the relation of parts from a mere graphic representation of it. With such, when a new machine is built, it is "cut and try." The difficulties to be met with are not first encountered and provided for on paper, and so all the experiments must be tried in wood and iron, which are much more difficult and expensive to change in shape or size than the pencil lines of a drawing It is not at all difficult for an experienced person to tell machinery which is carefully designed and worked out in drawings from that which is made by what are miscalled "practical men." It is observable, too, that all of the most successful builders of machinery either are good draftsmen themselves, or have such in charge of their establishments. Whenever the drawing department of a machine shop is neglected, it is a sure sign that the character of the work done there will deteriorate.

Now it would, we think, be very strange if it was found that the work done in shops owned by private parties to be done well must be first carefully designed by competent draftsmen, whereas that done in railroad shops required no such care. The fact is, however, that the work which railroad companies do for themselves is not obliged to come into competition with that made elsewhere, and their balance sheets are not so entirely dependent upon commercial management as are the operations of private firms. Therefore, blunders are not quite so apparently disastrous, although the actual advantage of the services of a skillful designer would be much greater in a large and extended establishment, like railroad works, than in a comparatively limited shop. In the one the operatives are under the direction of a greater number of men, who are at all times liable to change, and consequently without some system of mechanical records all sorts of confusion will ensue. That such is a very common result we believe the experience of nearly all master mechanics would prove. We know it is not a very uncommon thing to find roads on which hundreds and sometimes thousands of axles are bought each year, and yet there is no record anywhere of their dimensions. Sometimes, by a gradual process of change, the parts used assume proportions very unlike those of the original. It is absolutely necessary, if any system of uniformity is to be preserved, that those who do work should have accurate drawings, at least to refer to, if not to work from.

The value of drawings is, of course, dependent upon their accuracy. There is, however, no kind of work about railroad shops in which there are so many opportunities for the exercise of skill, taste and sound judgment, as in the design of new or even in the repair of old machinery. There is certainly no work pertaining to the operation of railroads whose value is so dependent upon its *quality* as the design of machinery. It would be quite amusing at times, if it were not so lamentable, to see how totally unconscious some master mechanics are regarding this fact. A draftsman, to such, is a person competent to make a given number of lines, and unless some egregious blunders are perpetrated, they do not seem to realize that there is any difference in the quality of the work. Now, a really valuable draftsman must be able not only to delineate correctly what he wishes to represent, but to judge *how* it should be represented and constructed. He should be capable of forming in his own mind a clear idea of the most practicable methods of doing work and of all the processes by which it is completed. He should be able to calculate and determine the strength of the various parts, and know the limits of other men's experience in similar machines or construction. The continued exercise of a sound judgment in such matters gives to a person a sort of mechanical sense which it is difficult to describe or define accurately. The possessor is fertile in expedients, clear in his deductions, ingenious in adapting means to ends, but in cases of doubt always adopts the side of safety. Such persons are usually observant, and by long experience have learned to separate the successful from the unsuccessful methods of construction. They always seek the protection of precedent, if there is one which covers their ground, but are not afraid of a bold move, if they are in a certain sense mathematically sure of success. It may seem that this is an extravagant estimate of the qualifications of draftsmen, but it must be remembered that it is their business to direct all the mechanics employed in the construction of a machine, and should therefore be able to determine how it may be done to best advantage. That this requires very nice discrimination, and often not a little invention, any one will know who has had experience of this kind.

It is, of course, possible to employ young men as draftsmen to do the routine work of an office, or have them work under the immediate supervision of some one of more mature experience. In all large railroad shops and engineers' offices, however, there is so much work to be done, and the duties of engineers and master mechanics are so multifarious, that it is impossible for them to give the care to details which they require in order to be properly worked out. There is no one who will be so valuable and efficient an aid as an experienced and clear-headed draftsman. One competent not only to make a good and artistic picture, but a person who has had considerable shop experience, who knows how work should be done, and who has ingenuity enough to devise ways and means of doing it. There is also another duty which should be fulfilled by the person in charge of the drawings. We refer to the adoption of some standard system of doing work. The difficulty of perfecting some method or system adapted to bring order out of the heterogeneous confusion which will often be found to exist on railroads no one can realize who has never had the experience. It requires ability of no mean order to do it. There are roads in this country now, on which are to be found an almost endless variety of patterns of wheels. axles, tires, etc., etc. Now to bring order out of confusion under such circumstances, to elim nate from this great variety some law or system adapted to the circumstances, and, more than that, to put *and keep* such a system in operation, would often be worth many thousands of dollars per year to railroad companies, whose auditors, treasurers and presidents often have no suspicion of the losses from this source. We believe there are a dozen roads in this country on which a skillful draftsman might make a good salary from the saving he could effect in the useless amount of material required by the patterns employed for brass castings. With the duties which are now heaped upon the shoulders of those in charge of shops, it is impossible for them to follow all the minute details which such economy would require. For such service they must depend upon men who have instincts for right proportion, and the requisite experience to guide them aright.

Many of our readers can, no doubt, recall blunders of the most stupid kind, which have been perpetrated and hidden because some structure was not first fully developed on paper. Some insuperable difficulty would be encountered, which was not foreseen and which a drawing would at once have revealed. Such cases are not rare. Of course it is not asserted that no errors occur when drawings are made. All draftsmen have recollections of some rather sombre experience, when, by oversight or want of care, mistakes occurred which they had good cause to lament. Such cases are, however, the result of carelessness and not of blind stupidity, as must inevitably sometimes be the case when no drawings are made.

St. Louis Traffic in 1872.

From the elaborate reports of the trade of St. Louis for 1872 published in the papers of that city, we select some of the facts most intimately affecting the transportation interests.

Regarding importations, the gross value warehoused was a little more than five millions, of which $972,824 were made under the new port of entry law, and were carried under bond and without appraisement. Of this latter amount $646,657, or about two-thirds, was imported by way of New Orleans, $295,488 by way of New York, $29,738 by way of Baltimore, and the balance, only $1,241, by way of Boston. Baltimore is, next to New Orleans, the port nearest to St. Louis. The amount of these direct importations was very small, it is true, but it is a new business and has but begun to grow. The imports under the same law (which was in force but part of the year) in 1871 were only $45,643.

The elevator capacity of the city was enlarged by the completion of three new elevators, of an aggregate capacity of 550,000 bushels, and the capacity of the five elevators now in operation is 2,250,000 bushels. Only one of these is on the Missouri side of the river, but that has capacity for 1,500,000 bushels.

The receipts of grain and flour are of peculiar interest, inasmuch as St. Louis has made unusual efforts to enlarge

this trade, which, compared with that of Chicago and Milwaukee, has always been small. For 1871 and 1872 the receipts were:

	1872.	1871.	Pr. ct. of inc. or dec.
Wheat	6,002,658	7,311,910	— 18
Corn	9,469,386	6,030,734	+ 57
Oats	5,417,800	4,358,099	+ 24¼
Barley	1,253,484	876,217	+ 43
Rye	374,571	374,336	— 1
Flour	1,289,031	1,428,403	— 12

Reducing to car-loads, this gives about 68,000 in 1872 against 61,500 in 1871, the increase in bulk being about 11 per cent. The enormous increase in corn receipts more than makes up for the large decrease in wheat and flour—these three staples constituting in both years just about five-sixths of the entire bulk of the grain traffic.

We have estimated this traffic in car-loads as an easy way of comprehending its importance, as in transportation the bushels of variable weight and the barrels do not represent at sight the real measure of the articles as subjects of transportation. But, of course, the receipts were by no means by rail only.

The amounts of wheat and flour received by each route are given, but, we are sorry to find, not those of the other grains. But we see that the railroads west of the Mississippi, four in number, brought about 150,000 barrels of flour and a little more than 1,000,000 bushels of wheat, or 14 per cent. of the former, and 18¼ per cent. of the latter; the steamboats from the Mississippi, the Missouri and the Illinois (with a trifle from other streams) about 270,000 barrels of flour, and 2,100,000 bushels of wheat, or 25 per cent. of the former and 37 per cent. of the latter; while the railroads east of the Mississippi brought about 670,000 barrels of flour and more than 2,500,000 bushels of wheat, or 61 per cent. of the former and 44¼ per cent. of the latter. A general failure of the wheat crop in Missouri greatly diminished the supply from that source, the eastern roads having brought to St. Louis in 1871 about a million bushels more than in 1872. Among the Missouri roads, the St. Louis, Kansas City & Northern and the Pacific of Missouri carried about four-fifths of the whole, and were very nearly equal, the former carrying a little more wheat and the latter a little more flour, and each the equivalent of about 725,000 bushels of wheat. The largest supply of both comes from the Upper Mississippi, on which about 20 per cent. of the wheat and 13 per cent. of the flour was carried.

Of the Illinois railroads, the St. Louis & Southeastern, young as it is, surpassed all others in the wheat and was exceeded by but one in the flour carried by it to St. Louis, the receipts by it being nearly 10 per cent. of the wheat and 11 per cent. of the flour. The St. Louis, Belleville & Southern Illinois carried more than 12 per cent of the flour, but not 2 per cent. of the wheat; the Vandalia line nearly 8 per cent. of the wheat and 7 per cent. of the flour; the Indianapolis & St. Louis line about 6½ per cent. of the wheat and 7 per cent. of the flour, the Chicago & Alton 6¼ per cent. of the wheat, but only 1½ per cent. of the flour; the Rockford, Rock Island & St. Louis less than 5½ per cent. of the wheat, but nearly 10 per cent. of the flour, and others smaller proportions. These receipts seem to be not quite complete, as their footing does not equal the figures given elsewhere as the total receipts.

While St. Louis is not now a grain market of the first importance, its flour trade is hardly excelled in the country. We have seen that its receipts of flour in 1872 were just about equivalent to its wheat receipts; but, what is more significant, its shipments of wheat were only 917,000 bushels, and its shipments of flour were 2,246,000 barrels, or 80 per cent. more than its receipts. The city buys wheat chiefly to manufacture and not to ship, and the demand for transportation from the city is eight or nine times as great for flour as for wheat. The contrary is the case with corn—which, indeed, is consumed chiefly without grinding.

We are sorry to find no tables of the amounts of flour and grain shipped by different routes, as the progress of St. Louis as a grain market depends more on its outlets than its inlets.

The next staple of large bulk which we will consider is live stock. Of cattle there were 269,384 (about 16,800 car-loads) received, and 164,772 (about 10,000 car-loads) shipped. Nine-tenths of the receipts were by four railroads west of the Mississippi—the Pacific of Missouri, 28 per cent.; the Atlantic & Pacific, 13 per cent.; the St. Louis, Kansas City & Northern, 25 per cent.; and the Missouri, Kansas & Texas, 24 per cent. Compared with the previous year there was an increase of 32 per cent. in receipts and 27 per cent. in shipments. The receipts of hogs were 759,076 against 632,210 in 1871, an increase of 20 per cent., and the shipments 183,693 against 113,655, an increase of 53 per cent. Nearly three-fourths of the receipts were from the same four railroads which supplied nine-tenths of the cattle, their proportions being as follows: Pacific of Missouri, 23⅝ per cent.; Atlantic & Pacific, nearly 6 per cent.; St. Louis, Kansas City & Northern, 38 per cent.; Missouri, Kansas & Texas, 5½ per cent. Of the roads east of the Mississippi, the receipts from the Vandalia line were nearly equal to those from the Missouri, Kansas & Texas, and all the Illinois roads carried about 18¼ per cent of the total receipts, the rivers carry 8 per cent., an inconsiderable fraction coming from the Iron Mountain road.

Comparing these figures with those reported for Chicago, we find that St. Louis received in 1872 not quite two-fifths of the number of cattle and less than one-quarter of the hogs received at Chicago, and that St. Louis' increase for the year was 32 per cent. in cattle and 20 per cent. in hogs; Chicago's, 36 per cent. in cattle and 36½ per cent. in hogs. We see, therefore, that the Chicago trade was not only much larger but that it grew faster during the year past, and that the progress of St. Louis, which has been great, has not been at all at the expense of Chicago.

The mineral traffic—chiefly coal and iron ore—is a very important part of the traffic of many of the St. Louis railroads, but we find no record of this.

There is one striking feature in these figures which may escape the casual reader, and that is the comparatively small proportion of shipments of all the staples except corn and flour. It is seen that St. Louis receives these products, not chiefly to sell, but to manufacture or consume. It manufactures most of the wheat consumed or packs most of the cattle and hogs that it receives. It is not a great market for selling grain or live stock to Eastern or foreign consumers, but it is one of the largest markets for flour and a large one for provisions. Altogether, the bulk of its traffic is very much less than that of Chicago, and consequently it affords much less business for railroads. It does not follow that its trade is unimportant or even less important; for this depends largely on the value of products as well as their bulk, and a trade of scores of millions in wool, leather, cotton, tobacco, etc., might afford very little freight to railroads compared with a trade of like value in grain and live stock. But we consider the matter solely in its relations to transportation, endeavoring to indicate what demands on transportation facilities are made by some of the most important staples bought, sold and manufactured at St. Louis.

The American Society of Civil Engineers.

On another page will be found a communication signed "C. P.," who, we may assure our readers, is a very warm friend of the Society, but who differs from some of the views set forth in an editorial article in the RAILROAD GAZETTE of December 21. While we cheerfully admit the difference between the objects of the Master Mechanics' Association and those of the Civil Engineers, and the similarity of the occupations of the members of the one and the diversity of the duties of those who belong to the other, which our correspondent has so clearly pointed out, and that "a part of the contributions" should be "records of experience; others devoted to the consideration of proposed schemes; others, and among the most useful are mathematical investigations of problems;" and that "in work of this kind one thoughtful mind, devoted to the subject, will accomplish more than a committee," we are nevertheless still of the opinion that the system of having reports made by special committees appointed to consider and investigate certain subjects on which a number, greater or less, of the members have experience, might be adopted to great advantage to the Society. This method of doing business was not intended to supplant that at present employed. In recording special experiences, or in certain kinds of investigation, as our correspondent very truly says, "one thoughtful mind devoted to the subject will accomplish more than a committee." There are, however, a class of subjects regarding which it is desirable, not so much to carry on special investigations and seek for new truth, as to compile and collect the results of the experience and knowledge of others. To this class belong the questions relating to the strength, form and endurance of railroad rails, the composition of cements, ventilation and warming of buildings, laying of foundations and many others which we might and more that we cannot now enumerate. One advantage which the committee system has is, that by a skillfully prepared series of inquiries it presents a "special stimulus" to engineers to record their knowledge and experience, which they will rarely put on record without some special incentive. This method of collecting and recording information has, however, no necessary relation to the Chapter system. It could be adopted either with or without Chapters, and need not in any way interfere with the preparation, the reading or the discussion of papers. The experiment could be tried without abandoning any of the present methods of carrying on the proceedings of the Society, and without adopting any changes in the organization.

We believe it would be more effective in increasing the usefulness of the Society than the Chapter system; but, if the members deem it advisable, both could be adopted, as there is no antagonism between them.

The Prospects for Grain Traffic.

The grain production of 1872, in eight States of the Northwest, is reported informally by the Bureau of Statistics. The States are Michigan, Indiana, Illinois, Wisconsin, Minnesota, Iowa, Missouri and Kansas, which some newspaper calls States of the "Mississippi basin," though Michigan has scarcely a mile of surface drained by the Mississippi, being indeed the only State bordering the lakes which is drained chiefly by the lakes.

The aggregate production of the leading grains of these eight States Mr. Dodge estimates at 580,000,000 bushels of corn, 126,000,000 of wheat and 104,000,000 of oats, being a considerable increase in corn over 1871, and probably some increase in the wheat production. With the exception of Michigan and Indiana, these States market most of their surplus grain at Chicago, Milwaukee and St. Louis, and the Great Lakes and the east-and-west railroad lines north of the Ohio carry nearly all of it. However, only a small part of the corn is ever shipped at all, and probably one-half of the wheat is either manufactured or consumed within the limits of these States. The total wheat product is sufficient to supply bread to about twenty millions of people, and if the people of the United States could be induced to eat corn bread alone, the product of these eight States would supply them all for a year and a half, or longer. But corn is for the most part fed to animals on the farms where it is produced, and the part exported is chiefly for the food of animals in the East, the amount used as breadstuff in Europe or in this country north of the Ohio River being comparatively insignificant. The amount exported depends largely upon the price and the cost of transportation. For the two past years the crops have been enormous beyond example; the price at the producers is extremely low, and the only obstacle to supplying all the world can consume is the cost of transportation. Being a low-priced, coarse product, it will not bear heavy tariffs any more than coal or ore will, and consequently a very large proportion of the exports have taken the lake route. Last season, however, the prices of lake transportation were unusually high, and this discouraged shipments. Rail rates have been about the same as usual—perhaps for the whole year a little higher than the previous year between Chicago and the East, and a trifle lower west of Chicago; but the market is fully stocked, and will not absorb the surplus unless there is a considerable decrease in cost at the places of consumption. How much more would be consumed if the price could be reduced in New York and New England by even so much as half the cost of transportation from Chicago to the seaboard, we may probably never know; but the indications are that the production is excessive. A permanent decrease in the cost of transportation would doubtless largely increase the consumption in the course of a year or two or three, but corn is now below its ordinary price in the consumers' markets, and consequently all the ordinary demands are fully satisfied.

The report of the Statistician indicates that the railroads will have an increase rather than a decrease in their grain traffic during the coming season. It is probable, however, that there will be a considerable increase of shipping on the lakes, and that the lake rates will be lower than last season, which will affect somewhat the rates as well as the amount of the grain freights from Chicago and other shipping points eastward, but increase the shipments over the railroads carrying to the lakes.

Record of New Railroad Construction.

This number of the RAILROAD GAZETTE gives information of the construction of new railroad track as follows:

Chicago & Paducah.—Extended from Bement northward 7 miles to Monticello, Ill. *Grand Rapids & Indiana.*—Extended 6 miles to a point 16 miles beyond Fyfe Lake. *Cairo & Fulton.*—Completed January 2 between Little Rock and the connection with the Iron Mountain road at the north line of Kansas, by the laying of 25 miles of track in Arkansas. *Atlanta & Richmond Air Line.*—Track laid from Greenville, S. C., westward 8 miles, to the Saluda River. *Northeast Pennsylvania.*—Completed from its junction with the North Pennsylvania Railroad at Abington (10 miles from Philadelphia), northeast 6 miles to Hatboro, Pa. *Atchison, Topeka & Santa Fe.*—Extended westward 57 miles to the western border of Kansas. *Missouri, Iowa & Nebraska.*—Extended from Griffin, Mo., northwest 25 miles to Centreville, Iowa. *Saginaw Valley & St. Louis.*—Completed to St. Louis, Mich., by an extension 8 miles westward.

This is a total of 143 miles of new railroad.

THE CHICAGO LIVE-STOCK TRADE affords so large a part of the freight of the Chicago railroads that the report of the receipts and shipments for the year 1872 deserve special attention. The receipts were 684,075 cattle, 3,252,623 hogs, 310,211 sheep, or about 45,000 car-loads of cattle, 60,000 of hogs and 4,000 of sheep, or about 109,000 in all—enough for ten large trains daily. There was an increase of 36 per cent. in cattle, 36½ per cent. in hogs and a decrease of about 1½ per cent. in sheep, the whole increase being equivalent to about 28,000 car-loads. Nearly all this live stock was carried into the city by six lines of railroad, which must have felt very sensibly this increase within a year of about 75 car-loads daily.

The shipments were, of course, smaller, as a large proportion of the live stock received at Chicago is shipped in the shape of provisions. Still the shipments include 510,025 cattle (about 30,000 car-loads), 1,835,594 hogs (about 23,000 car-loads), and 145,000 sheep (about 1,500 car-loads), an increase of less than 4 per cent. in cattle, 58 per cent. in hogs and 7 per cent. in sheep over the shipments in 1871, or, in all, an increase

of about 10,000 car loads. All these shipments, or very nearly, were carried by four railroads.

The immense bulk of this traffic is evident, and what makes it the more important is the fact that nearly all of it is moved by rail, and that the products of the slaughtered animals also supply freight to the railroads. Another important matter to be considered is the tendency of this traffic, which reports for thirteen years past enable us to study. We see from these that the business increases rapidly and almost uninterruptedly. The cattle receipts are more than four times as great as in 1860, and more than twice as great as in 1868. The hog receipts are nearly twelve times as great as in 1860 (which, however, were hardly half as large as those of any other year reported), about six times as great as in 1861, and nearly twice as great as in 1869 and 1870. The hog traffic, however, is somewhat fluctuating, as these animals are rapidly bred and reared, and a sharp demand one year may bring an oversupply within a twelve-month. The receipts of 1872 were astonishingly large, and the animals are also reported to be of unusually heavy weight. It can hardly be expected that the receipts will continue to increase at the rate of the last year, for there can hardly be a demand for such an enormous increase in the supply.

THE HURON AND LAKE ONTARIO SHIP CANAL, which probably suggested itself to the first man who saw a map of the great lakes, and has been seriously talked of and the subject of surveys for a great many years, is again talked of. It is intended to open a channel from the Georgian Bay through Lake Simcoe to Lake Ontario at Toronto, cutting off the sharp angle made by the lower end of Lake Huron, St. Clair River and Lake, and Detroit River with Lake Erie, and saving, it is reported, 400 miles in the distance from Mackinaw to Lake Ontario. The distances by different water routes from Chicago to New York and to Liverpool are reported as follows:

TO NEW YORK.	*Miles.*
Via Lake Erie and Erie Canal	1,615
Via Welland Canal and Oswego	1,170
Via Huron & Ontario Canal and Oswego	1,210
TO LIVERPOOL.	
Via Mississippi and New Orleans	6,000
Via Erie Canal and New York	4,600
Via Welland Canal and St. Lawrence	4,180
Via Huron & Ontario Canal and St. Lawrence	3,736

It seems to be taken for granted that the cost of transportation by the different water routes will be in proportion to their length; but this is by no means true. The cost of transportation on the open lakes is rarely burdensome when there is a sufficient supply of vessels; probably the additional cost of transportation through such a canal as that proposed would be fully as great as the cost of 400 miles of lake navigation by sailing vessels. The canal, however, has the further advantage of avoiding Niagara Falls by what we may call a "flank movement," and it is this, if anything, which gives the scheme claims for consideration. It would be much longer than the Welland Canal, or another connection of Lakes Erie and Ontario, and it would probably be much costlier in proportion to its length. From the Georgian Bay eastward to Lake Simcoe, 29 miles, it would ascend 130 feet, and from Lake Simcoe (which affords a navigable channel for 24 miles) to Lake Ontario, 47 miles, it would descend 430 feet by 31 locks. It is proposed to make it 100 feet wide at the water surface and 13 feet deep, admitting vessels of 1,200 tons burden. The cost is estimated at $36,000,000.

While this would open a shorter route from the upper lakes to tide-water, it would be of no service at all to Detroit and Lake Erie ports, and this fact, together with the difficulty and great cost of the work, will probably cause it to receive less favor than the enlargement of the Welland Canal, or some other project to connect Lakes Erie and Ontario.

FINE NAMES in the time-table of a new railroad, more especially a suburban line, is apt to make it a very perplexing study for an old resident of the district through which it passes. The old names which he has known from his boyhood have disappeared, and are replaced by high-sounding but often very inappropriate titles. So long as the country remained in comparative seclusion, the old names were good enough; but with the railroad comes a desire for change, and Smith's Corners and Jonesville must give way to Oakdale and Cedar Cliff. Of course the annoyances caused by these changes soon disappear, and though for a long time the new-comer and old resident alike will be frequently puzzled by the change, the new name will finally be accepted. It may be questioned, however, whether it is not often unwise to break up the associations connected with the old names by such a change, and whether the value of permanence as well as euphony is not to be considered.

NEW PUBLICATIONS.

The *American Artisan*, which, only six months ago, was enlarged to twelve pages like those of the RAILROAD GAZETTE, begins the new year with a second enlargement of four pages, making it a sixteen-page sheet, almost exactly the size of the old-established and prosperous *Scientific American*. Mr. S. H. Wales, who was formerly editor of the *Scientific American*, takes charge of the *Artisan* in its enlarged form, Messrs. Brown and Allen remaining, however, so that the accession of Mr. Wales is an addition of strength and not merely the change of one editor for another. The paper continues a handsome one, and with much matter interesting to mechanics, etc., of almost all classes, and the publishers promise to continue its improvement.

The Telegrapher, which enters upon its ninth volume with the new year, celebrates that event by an enlargement from eight to twelve pages. The chief fault of *The Telegrapher* heretofore has been its smallness: its circulation among telegraphers has become so general that advertisers claimed more than half of its space, and the problem with its editors has been what to leave out. This enlargement adds one-half to the reading matter, and enables the publishers to add very much to the value of their paper, which to very many telegraph officers and employees is their sole source of information concerning telegraph news and the progress of telegraph science. The paper is edited by experts in telegraph science, and hardly any authority in America gives or can more trustworthy judgments on electrical science and telegraphy. Telegraphers who wish to keep themselves informed of the progress of their art can hardly afford to do without it—as doubtless they have discovered before this time.

General Railroad News.

ELECTIONS AND APPOINTMENTS.

—W. A. Thrall, for many years Assistant General Passenger Agent of the Illinois Central Railroad, has accepted an appointment as General Ticket Agent of the Chicago & Northwestern Railway. Mr. H. P. Stanwood, for some years General Ticket Agent of the Northwestern, takes the new office of General Passenger Agent.

—Mr. H. B. Ledyard is appointed Assistant Superintendent of the Chicago, Burlington & Quincy Railroad, in charge of the Chicago Division.

—Mr. W. Carson has been appointed General Eastern Agent of the Mississippi Central and the New Orleans, Jackson & Great Northern railroads, with office at No. 20 Nassau street, New York.

—Mr. John D. Foster has been appointed General Freight and Passenger Agent of the Sheboygan & Fond du Lac Railroad, with office at Fond du Lac, Wis., in place of Mr. L. S. Hough, who has resigned on account of continued ill health.

—Colonel W. H. Coffin has been elected one of the vice-presidents of the Atlantic & Pacific Railroad Company. Colonel Coffin will have charge of the company's business in the State of Missouri. He has been for some time a director of the company.

—Mr. Marshall has been appointed Superintendent of the Flushing & North Side Railroad in place of R. J. Tucker, resigned. Mr. Marshall has been a conductor on the road.

—Captain W. J. Ross has been appointed General Superintendent of the Memphis & Charleston Railroad. Mr. C. S. Williams has been appointed Assistant Superintendent of the road.

—The Burlington (Iowa) *Hawkeye* of January 1, speaking of the consolidation of the Chicago, Burlington & Quincy and the Burlington & Missouri River roads, which took effect on that date, says:

"Mr. C. H. Chappel retains his position as Division Superintendent, with charge of the main line from Burlington to Ottumwa, together with the Keokuk and Quincy branches. Mr. W. B. Ryder remains as Train Master, and has charge of trains and the distribution of cars over all of Mr. Chappel's division. Mr. W. J. Edgar will have charge of the telegraph over the same routes, assisted by Mr. Beck. Mr. Challender, long Master Mechanic of the Burlington & Missouri River road, will remain in charge of that division and the shops at Burlington."

—Mr. D. E. Culver, of Jersey City, has been chosen Treasurer of the New Jersey Midland Railroad Company in place of Hon. H. R. Low, who has resigned.

—The Chicago, Clinton & Dubuque Railroad Company held its annual meeting at Dubuque, Iowa, January 1. The officers and directors chosen were the same as those of the Chicago, Dubuque & Minnesota Company, given herewith.

—Mr. Eben Rider, long Assistant Roadmaster on the Keokuk and Quincy branches of the Chicago, Burlington & Quincy road, has been appointed Roadmaster of the Chicago, Dubuque & Minnesota Railroad.

—At a meeting of the stockholders of the Pana, Carlinville, Carrollton & Clarksville Railroad Company, held in Carrollton, Ill., Dec. 28, the following board of directors for the ensuing year was elected: W. E. Hayward, Pana; Alvis Sharp, Zanesville; C. W. Weer, Carlinville; J. H. Rives, Fayette; J. B. Nulton, Greenfield; David Pierson, Robert Pierson, L. S. Eldred, J. B. Eldred, J. I. Thomas, R. H. Davis, Carrollton, and John O. Roberts, Clarksville. The board is the same as last year, except that G. P. Lawrence, of Pana, and George Wright and H. L. Clay, of Carrollton, give place to Messrs. Sharp, D. Pierson and Davis. At a meeting of the directors elect, the following officers were chosen: John H. Rives, President; L. S. Eldred, Vice-President; R. H. Davis, Secretary, and Robert Pierson, Treasurer. The officers and David Pierson constitute the Executive Committee.

—The annual meeting of the Chicago, Dubuque & Minnesota Railroad Company was held at Dubuque, Minn., January 1. The following board of directors was elected: J. K. Graves, Dubuque; J. F. Joy, Detroit; J. M. Walker, Chicago; J. A. Rhomberg, Dubuque; Nathaniel Thayer, H. H. Hunnewell, J. W. Brooks, Sidney Bartlett, J. A Burnham, Boston. At a subsequent meeting of the directory the following officers were elected: J. K. Graves, President; J. A. Rhomberg, Vice President; P. Kiene, Jr., Secretary, and C. H. Booth Treasurer. In the Board of directors Messrs. Joy, Walker, Thayer, Hunnewell, Brooks, Bartlett and Burnham, all of whom, with the exception of Mr. Hunnewell, are directors of the Chicago, Burlington & Quincy Company, take the places of Messrs. Bush, D. Rhomberg, R. Graves and W. Andrew, of Dubuque, and J. H. Merrill, of McGregor, Iowa. The other officers are all re-elected.

—A circular signed by Charles W. Pierce, Treasurer of the Atchison, Topeka & Santa Fe Railroad Company, and dated Boston, October 26, 1872, is as follows:

"At a meeting of the board of directors of this company, held this day, Mr. A. E. Touzalin was appointed General Manager of the Land Department of this company. All correspondence and documents relating thereto should be addressed to him at Topeka, Kansas, after January 1, 1873."

The following circular from the Superintendent, Mr. Geo. H. Nettleton, was issued December 15:

"Mr. A. E. Touzalin has been appointed General Ticket and Passenger Agent of this road. All communications relating to that department should be forwarded to him at Topeka, Kansas, after January 1, 1873."

—Mr. A. A. Perkins, Superintendent of the Conway Division of the Eastern Railroad, has received leave of absence for two months, on account of ill health. He goes to Florida. Mr. Wm. Jefferson will act as Superintendent of the Conway Division during the absence of Mr. Perkins.

—Mr. John Edson Sweet, of Syracuse, N. Y., has been appointed Professor of Mechanical Engineering in Cornell University.

—Messrs. Lindsay, Ingersoll, Cruger and Waugh have resigned their positions as directors of the Peoria, Atlanta & Decatur Railroad Company, and their places have been filled by Dwight Hitchcock, W. T. Sylvester, R. G. Hervey and F. C. Stratton. Mr. Hitchcock is President and Messrs. Sylvester, Hervey and Stratton directors of the Paris and Decatur Railroad Company. Mr. Hitchcock was chosen President and Mr. Sylvester Secretary and Treasurer of the Peoria, Atlanta & Decatur Company.

—Mr. John M. Kimball has been appointed Superintendent of the Erie & Pittsburgh Railroad. Mr. Kimball has been Assistant Superintendent of the road.

—Mr. Richard Wiggin has been appointed Superintendent of the Eastern Division of the Pittsburgh, Fort Wayne & Chicago Railway.

—Mr. C. F. Morse has been appointed Superintendent of the Burlington & Missouri River Railroad in Nebraska. Mr. Thomas Doane, who has been Chief Engineer and Superintendent, retires from the charge of the operating department of the road, retaining the office of Chief Engineer only.

—Mr. H. M. Flint is Assistant Superintendent of the New York & Oswego Midland Railroad, in charge of the Montclair Division.

—At the annual meeting of the Boston & Lowell Railroad Company, held at Boston, January 1, F. B. Crowninshield, Josiah G. Abbott, T. J. Coolidge and Edward W. Codman, of Boston, and Hocum Hosford, of Lowell, were elected directors. Mr. Coolidge takes the place of W. Minots, Jr., in the board, the others being re-elected.

—Mr. Webster Seymour has been appointed Superintendent of the Southern Division of the Illinois Central Railroad, with office at Centralia. Mr. Seymour has been in the company's service many years.

—At the annual election of the Harrisburg Car Manufacturing Company, at Harrisburg, Pa., the following officers were chosen: Wm. Colder, Jacob R. Eby, David Fleming, Henry Gilbert and John De Haven, directors; Wm. T. Hildrup, Secretary and Treasurer.

—The officers of the company which is to construct the St. Paul & Iowa Southwestern Railroad are as follows: Col. T. S. Sprague, Detroit, Mich., President; B. F. Hartshorn, Mason City, Iowa, Vice-President; B. F. Bush, Detroit, Secretary and General Superintendent; H. S. Sprague, Detroit, Assistant Secretary; F. L. Seltz, Detroit, Treasurer; A. K. Welles, Boone, Iowa, Assistant Treasurer; Amos D. Owen, Thornton, Ind., General Agent.

—The Allegheny Valley Company, having taken possession of the Buffalo, Corry & Pittsburgh road, Col. J. J. Lawrence, General Superintendent of the Allegheny Valley Railroad, is made General Superintendent of the Buffalo, Corry & Pittsburgh, and Mr. Charles J. Hepburn, now Assistant Superintendent in charge of the Oil Creek & Allegheny River road, will have immediate supervision of the road.

—The new board of directors of the Utica, Chenango & Susquehanna Valley Railroad Company has re-elected the old officers, as follows: President, Samuel Sloan; Vice-President, Lewis Lawrence; Treasurer, A. J. Odell; Secretary F. F. Chambers. These are all officers of the Delaware, Lackawanna & Western Company, which leases the road.

—The officers of the Lake Shore & Tuscarawas Valley Railroad Company are as follows: W. S. Streator, President; H. M. Townsend, Superintendent; W. H. Grout, Secretary, Auditor and General Freight and Ticket Agent; S. T. Everett, Treasurer; Hon. J. W. Tyler, Counselor and Attorney; Hon. R. B. Dennis, Land Agent; C. Fellows, Master Mechanic; Oliver Young, Superintendent of Construction. The company's office is at Cleveland.

—Mr. W. S. Mellen has been appointed General Freight, Passenger and Ticket Agent of the Green Bay & Lake Pepin Railroad Company, in place of E. J. Shaylor, resigned. Mr. Mellen's office is at Green Bay, Wis.

—At the annual meeting of the Grand Rapids, Greenville & Alpena Railroad Company, held at Grand Rapids, Mich., December 30, Hon. L. J. Macomber and Nathaniel Slaight, of Greenville, Mich., M. R. Jefferds, J. W. Winsor and Hon. E. S. Eggleston, of Grand Rapids, were chosen directors. Subsequently Mr. M. R. Jefferds was chosen President, Hon. L. J. Macomber, Vice-President, and C. J. Church, Secretary and Treasurer.

TRAFFIC AND EARNINGS.

—The earnings of the Kansas Pacific Railway for the third week in December were: from passengers, $17,005.30; freight, $29,677.94; mails, $2,055.31; total, $48,738.55. Of this amount, $3,566.16 was for the transportation of troops, mails and government freight.

—The earnings of the St. Louis & Southeastern Railway (consolidated) for the third week in December were $19,990.32.

—The earnings of the Great Western Railway of Canada for the week ending December 6 were: 1872, £23,108; 1871, £18,721; increase, £4,387, or 23½ per cent.

—The earnings of the Grand Trunk Railway for the week ending December 7 were: 1872, £39,700; 1871, £35,900; increase, £3,800, or 10⅝ per cent.

—The receipts of coal at Port Richmond for shipment during the year 1872 were 2,223,137 tons against 2,311,393 tons the preceding year, showing a decrease of 88,256 tons, or 3⅞ per cent. The shipments from Port Richmond for the year were 2,297,856 tons, distributed as follows:

	Tons.
To New England States	1,327,936
" New York	359,358
" Pennsylvania	198,375
" New Jersey	112,749
" District of Columbia	119,139
" Virginia	77,560
" Other Southern States	72,796
" Foreign countries	29,948

The largest shipments to foreign countries were to Canada, 14,809 tons, and to the West Indies, 14,014 tons. To Mexico 900 tons were shipped, and 65 tons to England.

—The earnings of the St. Louis & Iron Mountain Railroad for the third week in December were: 1872, $48,850; 1871, $41,539; increase, $7,311, or 17⅝ per cent.

—The earnings of the Marietta & Cincinnati Railroad for the month of December were: 1872, $204.1[illegible]; 1871, $169,820; increase, $34,376, or 20¼ per cent. The earnings for the year were: 1872, $2,029,927; 1871, $1,690,71[illegible]; increase, $339,213, or 20⅛ per cent.

—The earnings of the Erie Railway for the month of December were: 1872, $1,392,615; 1871, $1,416,217; decrease, $23,602, or 1⅔ per cent. The earnings for the year were: 1872, $18,346,049; 1871, $17,397,334; increase, $948,715, or 5 7-16 per cent.

OLD AND NEW ROADS.

New Mail Routes.

Postal service has been ordered on the new branch of the Chicago & Northwestern Railroad from Stanwood to Tipton, Iowa, nine miles, commencing January 16, pay not fixed, and on the Cayuga Lake Railroad from Cayuga to Aurora, N. Y., 12 miles, at $612 per annum, from the 15th inst.

Canada Pacific.

A correspondent of the Chicago *Tribune*, writing from Winnipeg, says that surveyors for this road report that the route east of the Red River is next to impracticable; and he also says that the thermometer at Winnipeg is shockingly indifferent to the comfortable isothermal line which sweeps through New York

and curves handsomely up through that place; that, in fact, on Christmas of 1871 it went down to 55 degrees below zero! From the Red River westward it is one level prairie, and the climate grows milder as we go westward.

Cairo & Fulton.

The last rail on the Northern Division (Little Rock to the connection with the Arkansas Division of the St. Louis & Iron Mountain road at the Missouri line, 160 miles) was laid January 2, and there is now a through rail route from Little Rock to St. Louis, on which it is intended to have through trains running by the middle of the month. A large force is working between Little Rock and Fulton, and it is promised that the entire line shall be in operation to the Texas border next summer.

Galveston, Harrisburg & San Antonio.

Mr. James Converse, Chief Engineer of this road, advertises that proposals will be received at the office in Houston, Texas, for the extension of the road from Columbus westward 40 miles, until the 31st inst. Proposals will be received for sections of ten miles, and for clearing, grubbing, grading, bridging, crossties and track-laying. Plans and profiles are to be seen at the office in Houston.

Buffalo, New York & Philadelphia.

The road was formally opened December 28, by an excursion from Buffalo to Emporium, Pa. Regular trains will be put on to Emporium at once.

Pennsylvania.

The agreement between the company and the city of Pittsburgh, with regard to the vacation of certain streets and the construction of tunnels or bridges at street crossings, which was made last summer, has at last been formally ratified by both parties. Work will soon be commenced on the improvements contemplated.

New Orleans, Mobile & Texas.

Work is proceeding steadily on the Texas Extension. The contractors have over 1,000 men at work on the section from Donaldsonville to Vermillionville, about 70 miles. About 30 miles of the grading west of Vermillionville is nearly done. The work on this section is very light. Track has been laid for three miles west of Donaldsonville.

Baltimore & Ohio.

Cumberland (Md.) papers report that the general transportation offices will soon be removed from Baltimore to Cumberland. Rooms are being fitted up in the new depot building at the latter place for the headquarters of Mr. T. R. Sharp, the Assistant Master of Transportation.

Atchison, Topeka & Santa Fe.

The road is completed to the Kansas State Line, 57 miles beyond the last terminus and 117 miles beyond Fort Dodge. The whole length of the road from Atchison to the State Line is 469 miles.

Harlem Extension.

This road is to be sold at Bennington, Vt., January 20, by order of the Court of Chancery of Vermont, in a foreclosure suit, the Union Trust Company of New York being plaintiffs in the suit. The amount claimed is $1,657,000, and costs. The company, which was formed by the consolidation of the Lebanon Springs, the Bennington & Rutland, and the Vermont & New York companies, has a road from Chatham, N. Y., to Bennington, Vt., 116 miles. For the year ending September 30, 1871, the last for which we have reports, the operating expenses of the road (including payments for car service) exceeded its receipts by $9,885. The total mortgage debt is $4,000,000.

Bangor & Calais Shore Line.

The City Council of Bangor, Me., has rescinded the order for an election on the question of taking stock in this company, at the request of the company, the reason given being that "the terms of the subscription were not satisfactory to the towns along the line which have already subscribed, without the condition imposed by the order of the city government (of Bangor), and which, if passed, would require all the towns which have voted to take stock to submit the question over again under the new conditions, and also require a change by the Legislature in the charter of the road."

Clinton Branch.

The Clinton Branch of the Kansas City & Memphis Railroad has been adjudged a bankrupt by the United States District Court at Jefferson City, Mo. It is stated that the road-bed and franchise will soon be offered for sale, and that it will be purchased by parties who will complete the road.

Suncook Valley Extension.

This company proposes to build an extension of the Suncook Valley road from Pittsfield, N. H., north to Alton, about 12 miles. Surveys are to be made at once. Samuel Ball, of Manchester, N. H., is President of the company.

Northeast Pennsylvania.

This road from Abington, on the North Pennsylvania, 10 miles from Philadelphia, northeast to Hatborough, about six miles, was opened recently. It is leased by the North Pennsylvania Company. Work has commenced on an extension to Hartsville, four miles further.

Southern Pennsylvania.

This road, from the Cumberland Valley road near Chambersburg to Mercersburg, was sold by order of the Supreme Court of Pennsylvania, December 21. The property, consisting of about 20 miles of road, 8,500 acres of land and the franchises, etc., was sold subject to a mortgage of $625,000 and also to a contract and lease to the Cumberland Valley Company. It was sold to John Rice, of Philadelphia, for $305,000.

Atchison, Topeka & Santa Fe.

This road was completed December 18 to the west line of Kansas, 469 miles from Atchison, and 57 miles from the recent terminus. The company has now, including the branch to Wichita, 497 miles of road, 382 of which it has constructed since last March.

Leavenworth, Lawrence & Galveston.

The Leavenworth (Kan.) *Times* reports than an agreement has nearly been completed between this company and the Kansas Pacific for the joint use of the track from Lawrence to Leavenworth. As soon as the arrangements are completed, the Leavenworth, Lawrence & Galveston trains will run through to Leavenworth.

A circular from Mr. Chas. B. Peck, the General Freight and Ticket Agent, announces that the station on this line heretofore known as Tioga, or Tioga Junction, will hereafter be known as Chanute. The towns of Tioga, Alliance and New Chicago, lying around this station having been consolidated and adopted the new name above noted.

Chanute is the junction of this line with the Missouri, Kansas & Texas Railway. Connecting lines, in printing new tickets for or *via* this point, are asked to observe the change in name.

Peoria, Atlanta & Decatur.

A contract has been made between this company and the Paris & Decatur, by which the latter company agrees to complete the road from Peoria to Decatur, provided certain towns which have heretofore voted aid to the road to the amount of $195,000 will go on and issue their bonds to that amount. The contracts heretofore made with the Messrs. Secor and the Toledo, Peoria & Warsaw Company have been assigned to the Paris & Decatur Company, on condition that the road from Peoria to Decatur shall be completed in eighteen months. The road will form an extension of the Paris & Decatur northwest to Peoria, about 70 miles. From Peoria to Atlanta, about 42 miles, most of the grading is completed.

Chicago & Illinois Southern.

An agreement has been made between the boards of directors of the two companies, by which this road is leased to the Paris & Decatur Railroad Company for 99 years. The road extends from Mattoon, Ill., northwest through Sullivan to a junction with the Paris & Decatur road at Mt. Zion, 10 miles south of Decatur. It is about 33 miles long.

Montclair.

The first time-table of this road, which will be hereafter known as the Montclair Division of the New York & Oswego Midland Railroad, shows two passenger trains running from Jersey City to Pompton Junction, a local passenger from Jersey City to Montclair, and two local passenger trains from Mountain View to Ringwood and Monks'. The stations and distances from Jersey City are as follows:

Jersey City	0	Little Falls	19
Pennsylvania Junction	2½	Singack	20
West End	4¾	Mountain View	22¼
Kearney	7½	Pequannock	24½
Newark	8¾	Pompton Plains	25
Montgomery	9¾	Riverdale	27½
Bloomfield	10¾	Pompton	28
Chestnut Hill	11½	Pompton Junction	28½
Montclair	12½	Wanaque	31¾
Watchung	13½	Midvale	33½
Cliffside	14½	Ringwood	35¾
Clove	15½	Monks'	38¼
Ridge Road	16¼		

The road leaves the New Jersey Division of the Midland road at West End, and crosses it again at Pompton Junction. At Mountain View the Boonton Branch of the Delaware, Lackawanna & Western is crossed.

Rockford, Rock Island & St. Louis.

This company formally notified the Peoria & Rock Island Company, January 1, that on the expiration of the required six months' notice, its contract for the use of the Peoria & Rock Island track from Orion to Rock Island would terminate. The rent paid for the use of this 18 miles of track has been $31,000 a year. The Rockford company has a branch line from near Hillsdale south to Minersville, from which, we believe, the iron was taken up some time ago. It is now proposed to relay the iron on this branch and extend it south to Orion, making a new line, over which all through business will pass, some 18 miles shorter than the present line through Rock Island. For Rock Island business a road-bed is already graded from Minersville to Coal Valley, about three and one-half miles, and iron will be laid on this and trains run to Coal Valley, from which point they will be taken into Rock Island by the Coal Valley Mining Company, which has a right to use the Peoria & Rock Island track from that point. A company has been formed to build the piece of road from Minersville south to Orion, eight miles. P. L. Cable is President of this company; P. L. Mitchell, Vice-President; H. Curtis, Jr., Secretary, and Judge Lynde, Treasurer. All of these are connected with the Rockford company.

Portland & Ogdensbr[illegible].

Work has been comm[illegible]ced on the section from North Conway, N. H., to Upper [illegible]rtlett, 12 miles. The grading on the next section of six m[illegible]s from Upper Bartlett will soon be commenced by Mr. C. C. Courtney, of Portland, Me., the sub-contractor. The heavy work in the Notch has been sub-let to H. J. Beeman, of New York. From the Notch to the Twin Mountain House, nine miles, the line has been located and work will be commenced in the spring. The rest of the line to the Connecticut River will be located in the spring. From Upper Bartlett west there is a grade of 93 feet to the mile and then for seven miles a uniform grade of 116 feet. Through the gate of the Notch the grade is 52 feet, and from the Notch to the Twin Mountain House, 86 feet to the mile. Mr. J. F. Anderson is Chief Engineer, Mr. Thomas E. Beverley has charge of the work from North Conway to the Notch, and Mr. S. L. Stevenson from the Notch to the Twin Mountain House.

Jackson, Lansing & [illegible]aginaw.

The stations on this road from Wells, Mich., to Otsego Lake, which portion of the road was constructed during 1872, are as follows:

Wells	0	Ogemaw	17¼
Culver	2	St. Helen's	28½
Rowena	3	Roscommon	37¾
Georgetown	5¾	Crawford	53
Wright's	8¾	Forrest	61¾
West Branch	13½	Otsego Lake	72¼

Wells is 54¼ miles from Saginaw City. The maximum grade is 50 feet to the mile, of which there is nine miles. On nearly one-half the road the grade is less than 10 feet. There is one curve of six degrees, eleven between six and two degrees, and nineteen of two degrees. The longest tangent is 15 miles, and there is another 14 miles long. The whole length of road now built from Jackson to Otsego Lake is 228¼ miles, and about 55 miles more remain to be built to reach the Straits of Mackinaw, the proposed terminus. The Michigan Central is now working the new section of the road.

Marquette, Houghton & Ontonagon.

The recently completed section of this road from Champion, the former terminus, to L'Anse, is 32½ miles long. From Champion west to Michigammi City, seven miles, the road passes along the north shore of Lake Michigammi, and then turns northwest past Spurr Mountain to L'Anse. The highest point on the road is at Summit, 10 miles from L'Anse, which is 1,167 feet above Lake Superior. From that point to L'Anse the work is very heavy, requiring some deep cuts and heavy fills and much trestle-work. There are no less than 20 bridges over Sturgeon and Fall Rivers in this 10 miles. The heaviest grade is 158 feet to the mile for the first mile out of L'Anse. At this place the company is building an ore dock, a round-house and repair shop, and expects to do a large business.

Atlanta & Richmond Air Line.

A correspondent writing from Greenville, S. C., informs us that work is progressing from that place, which is the terminus of the Greenville & Columbia Railroad. The track is laid for some eight miles from Greenville and the bridge over the Saluda River is nearly completed, and as soon as trains can cross it track-laying will be pushed westward,

Grand Rapids, Greenville & Alpena.

The President of this company informs us that the grading is completed for about 20 miles (Rockford eastward to Greenville), and that the road will be ironed for that distance as soon as the weather will permit. The road extends from a junction with the Grand Rapids & Indiana road at Rockford, 18 miles above Grand Rapids, Mich, northeastward toward Greenville.

Louisville, New Albany & Chicago.

It is reported that this road, extending from Lake Michigan at Michigan City nearly due south through the State of Indiana to its intersection of the Terre Haute & Indianapolis road at Greencastle, and thence southeast to the Ohio at New Albany, opposite Louisville, 288 miles in all, has been sold to capitalists who will work it in harmony with the Ohio & Mississippi in the south and the Lake Shore & Michigan Southern in the north. The road has been for some time in the hands of a Receiver, has long been—in large part at least—in very bad condition, and is counted a very poor property. It intersects the Lake Shore & Michigan Southern at La Croix, 9 miles south of Michigan City, and the Ohio & Mississippi at Mitchell, 61 miles northwest of Louisville. The section from New Albany to Mitchell forms, in connection with the Ohio & Mississippi, a favorable route, 274 miles long, between Louisville and St. Louis, and the 78 miles from Mitchell northwest to Greencastle will find a favorable route to Cincinnati, Washington and Baltimore over the same road. With the 49 miles of the Lake Shore & Michigan Southern west of La Croix it forms a route from Chicago to Louisville 330 miles long. Its Chicago business has heretofore been done chiefly over the Michigan Central, but there has not been a great deal of it, owing doubtless to the condition of the road. It is a little longer than another route, but could doubtless do a full share of the business if properly equipped and put in order.

Baltimore, Pittsburgh & Chicago.

With reference to this road the recent annual report of the Baltimore & Ohio Company says:

"The pressure of trade from the Northwest has constantly shown the desirableness and necessity of a line of railroad entirely under the control of the Baltimore & Ohio road from Chicago, and through the extensive and fertile intermediate regions, to Baltimore. For the purpose of effecting this connection with the least possible delay, it has been determined to construct the road from a point about ninety miles north of Newark, on the Lake Erie Division, to Chicago, a distance of 260 miles. The line has been located with low grades, and is singularly direct. It is expected that the entire road will be placed under construction within a brief period, and thus, through this extension, in connection with the Lake Erie & Central Ohio Division and the Baltimore & Ohio road, an available, economical and effective line from Chicago, but 811 miles to Baltimore, and, by the Metropolitan Branch, but 784 miles to the City of Washington, can be built and in use within eighteen months. The point of divergence of this road from the Lake Erie Division has also been selected as the proper location for the junction of the proposed line from Pittsburgh, so that the traffic of the main stem and of the Pittsburgh, Washington & Baltimore Railroad, and between Wheeling and Pittsburgh, and Chicago and the Northwest, will ultimately be concentrated on this route."

Stockton & Visalia.

A telegram from San Francisco announces that the people of Visalia have made up their share of the subscriptions for a narrow-gauge railroad to Stockton, intended to compete with the Visalia Division of the Central Pacific, which it would be near to. The construction of the road now depends upon the subscriptions of Stockton.

Holly Springs, Brownsville & Ohio.

The annual report of the president of this company states that the contract for clearing and grading the first section of 22½ miles north from Brownsville, Tenn., has been completed and two other sections have been let, one of which, however, has been abandoned by the contractor. It is now purposed to build the road of three feet instead of five feet gauge, as originally proposed, and to connect with the Cairo & St. Louis road on the north and the Middleton & Ripley road on the South.

Grand Rapids & Indiana.

The ninth section of this road has been examined and accepted by a commission appointed by the Governor of Michigan. This section is about 21 miles long and extends from a point 2½ miles north of Clam Lake to a point one mile beyond the junction of the Traverse City Branch with the main line. The road is now in operation to Fyfe Lake, 122 miles from Grand Rapids, and track is laid about 16 miles further.

Mineral Range.

This company has resolved to issue bonds to the amount of $200,000 on the first section of its road, for 12½ miles north from Hancock, Mich.

Saginaw Valley & St. Louis.

Regular trains are now running on this road from East Saginaw west to St. Louis, 34 miles. This is an extension of eight miles since our last accounts.

Mansfield, Coldwater & Lake Michigan.

The Detroit *Tribune*, of January 4, says: "On Saturday, December 21, Stephen C. Rose & Co., contractors for grading the Mansfield, Coldwater & Lake Michigan Railroad, commenced suit against the company in the Branch Circuit, laying their damages at $1,000,000. They claim that they have done a great amount of work, for which they have received nothing, and that they have fully performed their agreement with the company."

Columbus & Ferrara.

Action has been commenced to restrain the City of Columbus, O., from making a contract for the construction of any part of this road. The plaintiffs claim that the law under which money was voted for the road is unconstitutional, and also that the road will be of no practical benefit to the city.

Appleton & New London.

The bonds to the amount of $100,000 voted by the city of Appleton, Wis., to this road, the issue of which was prevented by an injunction, have been finally disposed of, the Supreme Court having made the injunction perpetual and the bonds having been destroyed.

St. Louis & Iron Mountain.

The bridge over the River des Pères at South St. Louis was carried away by a freshet, January 3, causing some little delay to travel.

Michigan Midland.

Iron for 25 miles of track is on the ground ready to lay. A meeting of the directors of this company and the Canada Southern will be held the second week in January.

Fitchburg.

There have been several conferences between the officers of this road and its western connections, the Vermont & Massachusetts and the Troy & Boston roads, to consider the subject of a consolidation of the three companies, but no definite conclusion has been reached.

The Boston *Advertiser* says that there have been rumors of a consolidation of the Fitchburg and Boston & Lowell companies. The union of these two companies would probably save both a large amount in the matter of new depot facilities in Boston. There does not, however, appear to be any foundation for these rumors.

Pennsylvania—New York Division.

The recent practical closing (by the heavy snows) of the Amboy Division to all through traffic put upon this division the whole of the through freight business. This was apparently more than the line had capacity, or at any rate terminal facilities for, and there has been almost a blockade. The local traffic was also much delayed and disturbed by the movement of freight, and there has been a great deal of complaint caused by the frequent delays of suburban passenger trains. A change is to be made at once, and a large portion of the freight will be sent by South Amboy as formerly, thus relieving the Jersey City line.

It is intended to enlarge the passenger depot in Jersey City,

now entirely too small, by making it twice the present width, and lengthening it so as to cover the space between the front of the present building and Greene street. This will give room for twelve tracks, and will make the platforms long enough for a train of 13 or 14 cars.

Eight new locomotives have been sent from Altoona for use on this division.

Ohio Valley.

Gallipolis has voted to subscribe $60,000 in aid of this proposed road.

Burlington, Cedar Rapids & Minnesota.

This company brought out in London about the middle of December an issue of $2,200,000 first-mortgage, 7 per cent., convertible sterling bonds, the price being 83, including interest since July. These bonds are secured by a mortgage on the 110 miles of the Milwaukee Extension.

Kentucky & Great Eastern.

Mr. Nathaniel Sands, of New York, the new President of this company, informs the citizens of Mason County, Ky., that means have been provided to construct the road from the east line of Bracken County (about 13 miles below Maysville) up the Ohio about 60 miles to a point opposite Portsmouth, O.; that grading will be begun as soon as possible, and that the road will be made ready for the iron by next July and ready for trains by October.

New York & Harlem.

The proposals recently received for the work on the Fourth Avenue Improvement between Forty-ninth and Seventy-ninth streets the Commissioners report to have been unsatisfactory, and they advertise that proposals will be received again until 2 p. m. of Monday, the 13th. They call attention to the fact that no offer will be considered unless the bond attached to the printed proposals is properly executed.

Montclair.

Trains are now running as far as Monk's Station, N. J., several miles beyond Ringwood.

Central of Long Island.

This road is finally completed and open for traffic. It was announced to be opened a few months ago, but just beforehand the mason work of the bridges was found to be defective, and the opening was postponed until the fault could be remedied. The road branches from the Flushing & North Side Railroad at the east end of the Main street draw-bridge in the village of Flushing, extends thence southeastward along the Flushing meadows, through the "Black Stump" district, crosses the Long Island Railroad at Hyde Park, skirts along the western border of Mr. A. T. Stewart's large tract of land, and, running nearly due east from Hempstead, terminates at Farmingdale, 30 miles from Flushing. The road is laid with steel rails, and great pains have been taken to make the road as perfect as possible.

Northern Pacific.

On the 3d of December the company sent out a party of engineers in sleds from the Red River crossing to inspect the structures and the condition of the road in Dakota, which is not worked this winter. The party was gone 20 days, found no heavy snows on the line and reported that a very few snow fences and sheds would protect the road in winter. Returning, the weather was extremely cold, and one day's journey was made with the thermometer 35 degrees below zero. Fifteen trains with freight for the west were found storm-bound at Cheyenne. The loss of iron sunk on vessels in Duluth harbor prevented the completion of the track to the Missouri last season.

Long Island.

This company is having a new steamer built at Greenpoint, L. I., by Messrs. Lawrence & Foulke, to ply between the terminus of this road at Greenport and New London, in this company's Boston line. It is reported that this boat is likely to be the fastest steamer afloat, able to make 25 miles an hour. It will have a dining room on the main deck 70 by 30 feet, where passengers will take their dinner in the course of their day's journey between New York and Boston.

New Orleans, Mobile & Texas.

The New Orleans *Picayune* says that work is proceeding without interruption on the Texas Extension. More than one thousand laborers are working away under the direction of Mr. J. Boynton, of the firm of Boynton Brothers & Bushnell, on the section from Donaldsonville to Vermillionville. Thirty miles of road-bed beyond Vermillionville are now ready for the rails. As far as Lake St. Charles the work is light and comparatively inexpensive. The road for three miles immediately west of Donaldsonville, the heaviest part of the work, is finished and ready for rolling stock. With twelve months extension of the charter stipulation regarding the construction of the trans-Mississippi part of the road, it is safe to say that its completion and the inauguration of direct railroad traffic with Texas, within that period, would be fully assured.

Milwaukee & St. Paul.

Commenting on the recent accident near Tomah, by which a passenger was killed in jumping from a car, it is shown that though the company has been in existence ten years, and has had always a large mileage and traffic, and now works more than 1,500 miles of road, only one other passenger has been killed on its lines, and he also in jumping from a car.

Mr. S. S. Merrill, the General Manager, has written a letter denying that the La Crosse Division, or any part of it, is in bad condition, or that accidents have occurred which could have been avoided by having the road in better order. There have been 17 days this winter on which the thermometer was below zero, and part of the time it has been from 20 to 40 degrees below, and the frost has had the usual effect of throwing track out of level and increasing breakages, but the road-bed is and has been kept in good condition, and the track is well tied and rails renewed as fast as necessary.

The trains on the Southern Minnesota and Chicago, Dubuque & Minnesota roads have commenced running over the winter bridge above La Crosse, Wis., and now deliver their freight and passengers in the Milwaukee & St. Paul depot at La Crosse, the depot at Grand Crossing being discontinued.

Wellington, Grey & Bruce.

The South Branch was opened to Listowell, Ont., December 19. This branch extends from the main line near Teviotdale southwestward about 17 miles to Listowell. There it is to make nearly a right angle and extend northwest to Lake Huron at Kincardine, about 50 miles.

Atlantic & Pacific.

This company is moving its machine shops at Pacific City up the road 205 miles to North Springfield, which is 205 miles from the eastern and 122 miles from the western terminus.

Dividends.

The Housatonic Railroad pays a half-yearly dividend of 4 per cent. at Bridgeport, Conn., January 20. The Paterson & Ramapo and Paterson & Hudson companies declared 4 per cent. dividends, payable January 3 at the office of the Rogers' Locomotive Works, New York, and after that date at the company's office in Paterson, N. J.

The Louisville & Nashville pays 3 per cent. after February 1. The Illinois Central pays 5 per cent. February 1. The Philadelphia & Reading pays 5 per cent. January 24, in Philadelphia.

LOCOMOTIVE RETURNS, JULY, 1872.

Master Mechanics of all American railroads are invited to send us their monthly reports for this table.

Name of Road.	Number of miles operated	Number of Locomotives in service	Mileage. Passenger	Freight	Miscellaneous	Total	No. of Miles run to Ton of Coal	Cord of Wood	Pint of Oil	Cost per Mile, in Cents. Repairs	Fuel	Stores	Miscellaneous	Engineers, firemen and wipers	Total	Average Cost of Coal, per ton	Wood, per cord	Oil, per gallon
Burlington & Missouri River	.....	67	53,374	83,760	48,933	186,067	44.28	128.62	14.62	4.63	7.89	0.71	....	7.86	21.12	$ 3.50	$ 3.40	....
California Pacific	148	8	8,453	4,660	2,000	15,113	.....	41.12	17.00	7.75	12.16	0.86	....	6.22	26.99	.....	5.00	1.20
Central Pacific	1,112.7	164	109,130	216,340	101,435	427,103	44.85	35.57	15.27	10.02	17.44	0.87	....	6.89	35.22	8.94	4.32	....
Central Branch, Union Pacific	100	6	5,675	3,110	3,357	12,142	70.50	.....	16.50	1.63	8.55	0.78	....	7.46	18.40	5.00	6.00	....
Chicago & Northw'n (Wis. & Mil. Div.)	89	69,209	84,777	45,847	199,833	36.91	.....	.....	8.60	11.40	0.91	....	....	3.53	29.44	3.50	4.75	....
" " " (Madison Div.)	.....	13	13,212	17,825	10,484	41,521	33.70	.....	.....	8.87	14.05	0.96	....	7.44	31.31	3.50	4.75	....
" " " (Galena Div.)	.....	64	50,875	57,305	41,500	149,680	39.07	.....	.....	8.65	9.35	0.99	....	9.01	27.98	3.50	4.75	....
" " " (Iowa Div.)	.....	75	49,918	60,990	39,942	150,850	39.03	.....	.....	6.74	9.30	0.97	....	8.56	25.63	3.50	4.75	....
" " " (Peninsula Div.)	.....	20	3,596	33,630	22,931	60,157	45.08	.....	.....	1.71	10.54	0.83	....	6.49	19.57	3.50	4.75	....
Chicago, Rk. Isl. & Pacific (Ill. Div.)	.....	80	39,751	130,002	6,861	176,614	49.87	.....	19.00	4.56	5.75	0.50	....	6.91	17.70	2.75	4.00	....
" " " (Iowa Div.)	.....	101	77,461	138,234	38,938	254,633	47.73	.....	14.55	3.50	5.93	0.61	....	6.98	17.02	2.75	4.00	....
Cincinnati, Lafayette & Chicago	.....	5	3,750	10,500	520	14,770	40.26	.....	14.68	0.67	8.15	0.47	....	7.36	16.62	.....	.....	....
Clev., Col., Cin. & Indianapolis	475	136	72,889	173,839	96,443	343,171	50.50	.....	19.12	3.41	6.14	0.66	....	7.25	17.46	3.16	.....	....
Cleveland & Pittsburgh	.....	77	.....	.....	.....	211,032	65.48	.....	18.62	2.58	4.35	0.71	....	7.19	14.86	2.25	1.98	0.20
Denver Pacific & Denv. & Boulder Vall'y	.....	.....	3,900	4,284	9,365	17,639	69.42	.....	14.32	4.96	5.11	0.65	....	7.23	17.96	.....	.....	....
Erie (Eastern Division)	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....	.....	....
Flint & Pere Marquette	.....	29	20,615	22,435	22,013	65,063	.....	64.56	26.33	4.23	6.85	0.70	....	7.51	19.41	.....	4.58	....
Hannibal & St. Joseph	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	....	.....	.....	.....	.....	....
Illinois Central (Chicago Division)	252.50	67	38,651	88,749	41,673	167,073	39.89	.....	12.55	9.01	5.16	0.63	....	6.87	21.67	1.90	4.30	0.50
" " " (South Division)	230.75	34	26,726	40,969	9,775	77,410	43.53	.....	10.84	8.89	4.84	0.83	....	6.62	21.14	1.90	4.30	0.50
" " " (North Division)	225	45	29,617	64,109	13,318	107,044	35.45	.....	11.44	8.66	5.75	0.76	....	6.70	21.84	1.90	4.30	0.50
" " " (Iowa Division)	401	36	26,887	49,788	10,009	86,684	37.87	.....	18.68	8.04	6.94	0.55	....	6.62	22.15	2.50	5.50	0.50
Kansas Pacific	.....	.....	63,356	76,719	41,766	181,841	44.65	.....	12.38	6.85	9.02	0.72	....	7.12	23.71	.....	.....	....
Lake Sh. & Mich. Sou. (Buffalo Div.)*	.....	84	38,280	97,370	61,640	197,190	50.00	.....	21.50	5.30	5.80	.....	....	6.10	17.30	3.50	3.50	....
" " " " (Erie Div.)*	.....	90	35,675	122,292	47,616	205,583	57.00	38.00	16.00	5.91	6.60	.....	....	6.70	19.21	3.50	4.00	....
" " " " (Toledo Div.)*	.....	76	39,240	109,830	39,610	188,780	59.00	64.00	22.00	4.31	6.65	.....	....	6.60	17.56	4.00	4.00	....
" " " " (Mi. & So. Div.)*	.....	163	122,138	195,754	172,680	490,572	49.79	54.34	32.76	5.54	6.87	.....	....	5.86	18.27	4.50	3.50	....
Leavenworth, Lawrence & Galveston	.....	17	17,579	17,460	3,393	38,342	76.37	.....	28.80	1.85	5.73	0.48	....	7.71	15.75	4.00	4.00	....
Missouri River, Ft. Scott & Gulf	.....	23	12,891	15,855	12,763	41,509	74.10	.....	29.80	6.78	2.95	0.43	....	7.95	18.11	.....	.....	....
Marquette, Houghton & Ontonagon	.....	14	.....	.....	.....	38,252	59.11	.....	16.20	3.94	8.13	0.88	....	7.77	20.72	4.60	2.00	....
Pacific, of Missouri	.....	.....	74,703	122,356	54,890	251,949	40.50	.....	12.40	4.50	7.00	0.70	....	6.20	18.40	2.76	4.10	....
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Pennsylvania (New York Division)	.....	100	143,645	82,393	5,009	231,047	39.63	34.48	9.03	5.60	15.0	1.30	....	.....	21,90	0.20	5.60	....
" (Amboy Division)	.....	53	52,154	50,054	6,578	108,876	53.55	53.86	13.77	6.40	10.4	1.00	....	.....	17.80	0.20	5.60	....
" (Belvidere Division)	.....	32	21,754	32,352	4,597	58,703	44.93	51 54	12.75	4.90	12.3	1.30	....	.....	18.50	0.20	5.60	....
" (Philadelphia Div.)	.....	129	74,202	249,344	10,852	334,398	35.39	.....	16.72	5.60	5.40	1.80	....	.....	11.80	0.06	3.60	....
" (Middle Division)	.....	117	59,649	252,525	12,919	325,093	33.32	.....	23.15	5.10	5.54	1.70	....	.....	11.30	0.06	3.60	....
" (Pittsb'g Div., E. End.)	.....	83	14,149	135,973	3,981	154,103	25.74	.....	12.35	7.70	7.01	1.10	....	.....	15.80	0.06	3.60	....
" (Pittsb'g Div., W. End.)	.....	110	61,687	179,779	14,059	255,525	37.60	.....	16.72	8.20	5.01	1.80	....	.....	14.00	0.06	3.60	....
" (Tyrone Division)	.....	27	11,849	33,158	2,440	47,447	32.15	.....	27.03	6.50	6.60	0.70	....	.....	13.20	0.06	3.60	....
" (West Penn'a Div.)	.....	21	16,875	29,261	3 984	49,800	44.19	.....	36.23	5.10	4.20	0.40	....	.....	9.70	0.06	3.60	....
" (Lewistown Division)	.....	7	7,425	5,070	1,526	14,021	74.72	.....	12.89	5.90	2.68	0.90	....	.....	9.48	0.06	3.63	....
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Pittsb'g, Ft. Wayne & Chic. (E. Div.)	319.2	149	80,178	200,614	9,254	380,046	46.68	.....	14.92	4.67	5.63	0.89	1.49	7.31	19.99	2.62	.....	....
" " " (W. Div.)	280	98	85,583	166,842	23,690	276,105	122.50	32.10	19.90	5.40	9.20	0.60	....	6.90	22.10	2.50	3.25	....
Pittsb'g, Cin. & St. Louis (L. Miami Div.)	.....	41	56,741	50,751	3,345	110,837	46.90	.....	12.10	6.50	6.50	0.56	1.30	8.00	21.10	2.20	3.15	....
San Francisco & North Pacific	33	3	4,185	3,780	620	8,585	.....	40.88	19.12	18.99	12.23	0.75	....	4.94	36.91	.....	5.00	....
South Carolina	.....	35	15,600	36,388	13,880	65,868	.....	10.67	33.33	6.80	4.81	0.76	....	.....	12.37	.....	2.44	....
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Louisville & Nashv. (Main Stem)	.....	75	54,519	112,210	6 703	173,432	.....	.....	13.00	9.31	10.23	0.60	0.92	9.18	30.24	0.15	3.25	0.33
" " " (Clarksville Div.)	.....	6	938	3,388	2,305	11,631	.....	21.27	14.00	6.15	7.94	0.33	1.98	8.61	25.01	.....	2.65	0.33
" " " (Memphis Div.)	.....	15	19,243	15,985	5,297	40,525	.....	32.44	14.40	9.86	13.82	0.84	2.54	8.44	35.50	.....	3.25	0.38
" " " (Decatur Div.)	.....	15	17,070	8,314	1,300	27,184	.....	38.41	15.20	13.14	9.08	0.71	1.47	8.47	32.87	.....	3.50	0.33
Louisville, Cincinnati & Lexington	.....	....	35,483	24,199	11,856	71,538	.....	36.02	11.53	2.21	11.91	1.04	....	0.24	24.40	.....	.....	....

* Switching Engines allowed six miles per hour

The Eastern and the Portsmouth, Great Falls & Conway pay each 3 per cent. in Boston January 15. The Michigan Central pays a 4 per cent. stock dividend January 27.

Buffalo, Corry & Pittsburgh.

We reported recently the sale of this road to the trustees of the bondholders. A telegram dated the 1st says that it has been purchased by the Allegheny Valley Railroad Company. The road extends from Corry, Pa., at the northern terminus of one line of the Allegheny Valley road, northward to Brocton, N. Y., which is on the Lake Shore road 49 miles from Buffalo, and completes a pretty direct north and south line 219 miles from Pittsburgh to Lake Erie, which the Lake Shore road extends northeast to Buffalo, giving a route over which through trains are run 268 miles long from Pittsburgh to Buffalo.

Mansfield, Coldwater & Lake Michigan.

A party of officers of the Pennsylvania Company has recently passed over this new road. The road was pronounced in good condition. It extends from Mansfield, Ohio, northwest to Tiffin, 43½ miles, and in connection with the Toledo, Tiffin & Eastern, also recently completed, forms a line from Mansfield to Toledo, 87 miles long. The Toledo connection having been completed, the working force will be transferred to the main line west from Tiffin, on which work will now be pushed.

Railroad Construction in Ohio.

The message of Governor Noyes, of Ohio, submitted to the Legislature of that State a few days ago, contains the following concerning railroad construction in the State:

"During the past year two hundred and seventy miles of railroad have been constructed and put in operation within the limits of our State. The rails have been laid upon three hundred and twenty-two miles in addition, and charters for the construction of four thousand miles more have been granted. This is certainly an indication of enterprise and a progressive spirit; we hope it will nowhere prove the evidence of recklessness or the result of miscalculation. Railroads should be built whenever the advantages to be derived from them overbalance the cost. But a caution may be necessary, lest some of our cities, towns and villages may burden themselves with a debt for which there will be no adequate return. Men sometimes, upon impulse and under excitement, do what the sober second thought condemns. It is not here intended to discourage, in general terms, the building of railroads, or to retard, in any possible way, the development of our resources. I know there are many localities in the State where the convenience, comfort and financial prosperity of the people absolutely require additional railroad facilities. Wherever wealth can thereby be created, or our products increased and brought near to ready markets, railroads should be built; but these enterprises should be prosecuted with discretion—thoughtfully, soberly, deliberately. Without having any particular instance of mistake in mind, I make these suggestions in anticipation of a possible danger, considering the experiences of the past year.

"The investigations already made demonstrate the necessity for a thorough examination of all the railroad bridges and trestle-work of the State, some having been found in a very weak and dilapidated condition. I recommend that the Commissioner of Railroads and Telegraphs be authorized to employ such assistance as may be needed, and that he be provided with funds to pay the expenses thereof."

Illinois River Improvement.

The Illinois Canal Commissioners report that the lock at Henry, which has been in use for one season, fully demonstrates the feasibility of the improvement of the whole river below Henry, with four more locks and dams between Henry and the mouth of the river, at a cost of not exceeding $1,800,000. The navigation of the river will be good from La Salle to its mouth, a distance of 230 miles, for the largest class of steamers, and this at a cost of $12,000 a mile, including what the United States Government shall expend in dredging, say $440,000. The lock at Henry will pass twelve canal boats at one lockage. When the river is improved as above indicated, steamers of 1,200 or 1,500 tons burden can navigate it, and run directly through from La Salle to New Orleans at certain seasons of the year. Light-draft boats can run to and from La Salle to all points on the Ohio and Missouri and Upper Mississippi rivers. Canal boats, loaded to the full capacity of the canal, carrying 6,000 bushels of grain, or 100,000 feet of lumber, can be towed, by suitable tugs, in squads of eight or ten each, and all pass the locks at once. The navigation of the Illinois River is now exceedingly uncertain. The additional expenditure of $1,800,000 would make it certain for from eight to eight and one-half months in the year. Thus it will be seen that the cost of the improvement of the entire river (230 miles) being only about $12,000 per mile, will be the least expensive work of its capacity ever constructed in this or any other country.

Providence & Worcester Report.

The report of this company for the year ending September 30, 1872, gives the receipts for the year as $895,897 and the expenses as $655,971, leaving the net earnings $239,926, the expenses being 73¼ per cent. of the gross earnings. The earnings for the preceding year were $829,218 and the net earnings $205,812, showing an increase last year of $66,679, or 8 per cent. in the gross earnings, and of $34,114, or 16½ per cent., in the net earnings, notwithstanding a reduction of 10 per cent. was made in the freight and passenger tariff last March. These earnings are at the rate of $18,284 per mile. The road extends from Providence, R. I., to Worcester, Mass., 45 miles, and the company leases the Milford & Woonsocket road, four miles long. The capital stock is $2,000,000 and the bonded debt $300,000.

The second track has been laid from Worcester to Farnumville, which, with the 18 miles previously laid on the Providence end of the line, makes 30 miles of double track. The remainder will be laid as fast as the company can do the work with its own labor.

The new passenger station at Pawtucket, built in connection with the Boston & Providence Railroad, has been finished. The passenger stations at Woonsocket and Central Falls have been enlarged and a new station finished at Ashland. Six new passenger cars, four new locomotives, 100 coal cars and ten platform cars have been added to the equipment, beside 29 box and platform cars to cover depreciation. Four more passenger cars and two more locomotives are in process of construction.

An arrangement has been made with the New Jersey Central Railroad and Pennsylvania coal companies, by which they are to build large and commodious wharves below India Point, for the landing and storage of coal, and this road is to connect therewith by a branch road to Valley Falls along the east side of Seekonk River, to be built on joint account with the Rhode Island & Massachusetts Railroad Company, which it is expected will be ready for operation during the present year.

The bridges in Massachusetts have all been widened for the double track and rebuilt at great expense. An elevator for the storage of grain, of the capacity of nearly 200,000 bushels, has been constructed in Providence during the present year, which will relieve in a great measure the detention of cars for that purpose. The usual maintenance of way has been fully kept up at an expense of more than $150,000, and altogether the road is in excellent condition for its business. The Milford & Hopkinton Railroad, which forms an extension of the Milford & Woonsocket to the Boston & Albany at Ashland, has been completed and leased to the Providence & Worcester Company for ten years.

Springfield & Illinois Southeastern.

A telegram from Pana, Ill., says that the enginemen and the employees in the shops of the company in that place have struck in order to obtain the pay due them for the last three months. The men do not desire higher pay, but wish to obtain that which is due them.

Northern Central of Minnesota.

A bill has been introduced in Congress to incorporate this company with a capital of $35,000,000 and authority to build a railroad from a point on the Northern Pacific Railroad, west of range 34, southwest through Otter Tail Lake and Fergus Falls in Minnesota, and through Dakota to some point on the Union Pacific west of the 105th meridian.